MANAGEMENT VIEW

COMMUNITY SERVICE CONTRIBUTIONS re generally the big difference beween the investor-owned utility comanies and government power in the eyes f the public, says Interstate Power o.'s Pres. Milton Kapp. The PIP Comittee Chairman proposed to a NELPA udience last month that the investor-wned utilities "need a new frontier" f their own to protect the American usiness system. Seeking support for well-rounded industry programs" and ointing up a need to arouse top utility xecutives to recognize that the indusry's securities future is at stake, he arned of the threat in investors losing aith in the electric utility industry.

REA EXPANSION SPREADS in new deelopments across the country (see age 50), but the best defense in this ituation is still a good offense. xample: the State of Iowa, where nterstate Power Co.'s Pres. Milton Kapp cknowledges, "we have problems with he REA's." His solution: plant tours or farmers and their wives, dinners . . . and the company's annual report. esult: appreciation of the kind of a ob Iowa investor-owned utility comanies are doing in serving half 50,000) of the state's rural users.

ROLE IN NEAR WARNING SYSTEM, recomended by EEI Pres. Fleger last month following an extensive study by the nstitute) is supported by an offer of ullest cooperation to the Office of ivil Defense in further testing. ederal funds would be used to cover he cost of signal generators required n carrying the system's electrical mpulses on regular power lines. See EL&P, Nov. 15, 1960.)

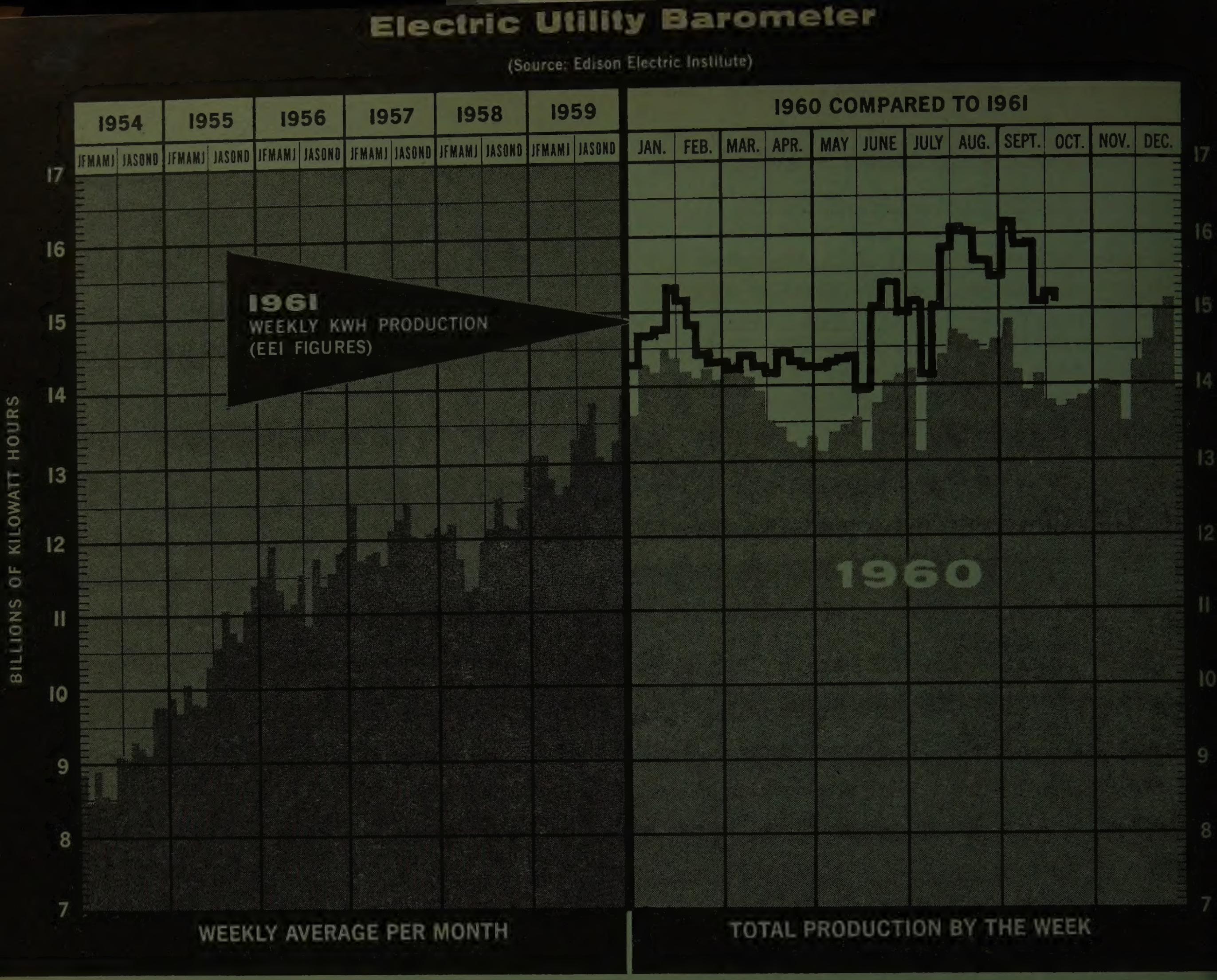
OVERALL COMMUNITY SERVICE which e try constantly to provide, is relected in the contribution of CEI mployes to higher education, says leveland Electric Illuminating Co.'s res. Ralph M. Besse. On their own ime, 12 employees of the utility are businessmen or engineers by day, eachers by night." The employees eel it works both ways: the school gets a chance to benefit from their experience and training, the teaching provides them with a constant stimulus in their work.

PUBLIC UTILITY FINANCING in the first nine months of 1961 was up 35-percent over the same period a year earlier. But, big increase in gas and telephone industry financing was offset with a quarter-billion dollar drop-off (to $1,047,490,000) for the electric companies.

CONSOLIDATED SERVICE PATTERNS are being achieved by investor-owned companies (Columbus and Southern Ohio Elect. Co. and Ohio Midland Light & Power Co.) in Ohio with a transfer of property that also merges certain operations of the latter with facilities of the South Central Rural Elect. Cooperative, Inc. of Lancaster, Ohio. Welcoming 10,000 new customers to the co-op's service lists, South-Central's Pres. John Eakin notes that his utility now serves about nine customers per circuit mile of wire, whereas it formerly served only four. In a joint announcement of the transfer, he adds: "In a rural electric cooperative, every member has a voice in determining the policies under which he receives service."

BPA PROBLEM JUST NOW, according to Administrator Chas. Luce, is "not so much one of rates as it is of sales." Operating in the red since 1951, Bonneville has accumulated a still-growing surplus of secondary power, while disposal to industries has become increasingly difficult. Even as his predecessors under a GOP Administration avoided a rate boost, the present BPA chief resists one for fear it would "price BPA out of the market." But, he warned the agency's newly reactivated Regional Advisory Council last month that, if the agency's deficit picture continues, such a rate increase is inevitable.

A "ROLLING MATURITY" PLAN may be recommended by Bonneville Power Administration "to bring BPA accounting more in line with economic facts." Deficit-



Electric Utility Barometer

(Source: Edison Electric Institute)

NEWS IN PERSPECTIVE

plagued BPA officials unveiled this possibility last month, suggesting that such a plan, rearranging amortization of BPA facilities on a new 50-year amortization schedule each time a project is completed--could reduce annual payout requirements by as much as $9-million a year.

ECONOMIC CLIMATE

BUSINESS IS GOOD--so good, in fact, that it may be wise to look for clouds in the distance. There is no compelling reason for a drift toward pessimism. But a sound perspective of the future is rarely lost by a look in all directions. Predictions of the economic future have recently been so uniformly bright that there is a tendency to ignore problem areas while concentrating on the bright spots.

OPTIMISM IS JUSTIFIED, right now, of course. On balance, the reasons for expecting a steady rise in the national economy far outweigh the drags. Powerful boosts to business in general will be forthcoming as all levels of government boost their spending by $12-billion this year. Indications are that plant and equipment outlays by business will rise, though not dramatically. Spending by business for new capital goods and buildings tends to be a slow starter in times of recovery, and it is not unusual for consumer spending to be sluggish, too, when a change of economic direction has taken place. The employment situation has already taken a turn for the better. It is a key to continued recovery: consumers will remain uneasy about spending freely as long as joblessness is high. President Kennedy's statement that he will present a balanced budget for fiscal 1963--barring unusual military demands

r funds--is heartening even though
 is probable that the budget will
ecome unbalanced later in the year.
ile a creeping rise in prices is
ell-nigh assured, the chances of a
rging inflation are minimal.

WASHINGTON INFLUENCE

REPORTING PROGRAM ON IDENTICAL BIDS
as been extended by Justice Department
 2,000 state and local governments.
ttorney General Kennedy said the pro-
ram, to be administered by the Anti-
rust Division, should have deterrent
ffects. Any indication of rigged bids
ill get action from the federal gov-
rnment except when interstate commerce
s not involved. In that case, the
tate will get the information.
dentical bids on items costing more
han $1,000 will be covered. The 2,000
nits range from states to school dis-
ricts and special periodic surveys
ill add another 100,000 governmental
nits to the program.

Stiffer penalties were also endorsed
y Justice and FTC--especially raising
aximum fines from $50,000 to $100,000
er violation and making corporate
fficials responsible even though they
ay not be directly involved. Antitrust
hief Loevinger noted that in the case
f one firm guilty on multiple counts,
otal fines were less than one-
housandth of the 1960 income.
oevinger did oppose the Kefauver bill
o make price-fixing carry heavier
ines than other antitrust violations.
ffidavits of non-collusion on bids got
ustice's approval.

PUBLIC POWER PUSH by Interior De-
artment bigwigs continues unrelent-
ngly. Interior Secretary Udall seems
ardly ever to lose an opportunity to
lump for more federal power--and he
nd Assistant Secretary Holum some-
imes accompany their views with sharp
igs at investor-owned utilities.

Controversial Colorado River Project
ransmission lines, for example, are
eavily weighted in favor of federal
ctivity; the Secretary thinks the
integrity" of the system will be
eopardized if it has a non-federal
backbone." Next year, plans for fur-
her federal encroachment on investor-
wned utilities may be broached to Congress when Interior--"in the interest of everyone"--proposes interconnecting public hydro plants and private thermal operations on a regional basis. Next year, too, the Department is expected to make a fight for writing a preference clause into the Delaware River Basin Compact. Interior already has a special task force studying the feasibility of interconnecting Bonneville and the Central Valley Project, and more such plans will be made.

As Secretary Udall sees it, "interconnected operation with other federal hydroplants is in line with federal policy which has been upheld repeatedly by Congressional action . . . most recently in connection with the all-federal Colorado River Storage Project backbone transmission system for which construction funds were provided by Congress. . ."

The Secretary, of course, says that he looks forward "to working with public and private utilities alike"--but he notes that TVA "was forced to put in thermal capacity until it now exceeds the hydro output." He says "we have no intention of proposing a similar Valley Authority in the West," preferring to see public and private power producers "work together" to make all the area's power capacity "more valuable and economical." He doesn't say what might happen if a businesslike agreement is not.

USE OF PUMPED STORAGE at CVP will be studied by Interior. Secretary Udall suggests a "cold, hard look" at long-term possibilities for Shasta and Trinity and proposed Auburn. He is also hopeful for an agreement with Pacific Gas & Electric—one "mutually beneficial to the consumers of PG&E and to the Federal taxpayer"--for an exchange of firming power for secondary power and the "advantages of integrating the company system with the substantial capacity" of CVP. Udall also wants negotiations with public agencies started at once for marketing at least 250,000 kw when Trinity power becomes available.

REPAYMENT OF BILLIONTH DOLLAR TO REA has been hailed by REA Administrator Clapp as a "dramatic demonstration that REA loans are not an expense, but an investment." When REA started, only

10.9-percent of farms were electrified; now 97-percent are. Clapp says, "The job is far from done." He wants to deal with "future needs" of the systems and "protect their effectiveness and security."

LONG-RANGE GOALS for natural resource planning is now under the Interior Department's Resources Program Staff--an upgrading to policy level of its old Technical Review Staff. RPS will work with top-level personnel in all areas to determine future needs, planning alternate developments and evaluating progress.

NEW FRONTIER AT FPC became complete with former chairman Kuykendall's resignation effective Jan. 1. Kennedy appointments, some of them controversial, have included three Democrats and one Republican. (In resolutions adopted at the recent NARUC convention, the state commissioners urged the increase of both compensation and terms of Federal regulatory commissioners--to ten years.)

INDUSTRY SIFTINGS

NEW EHV LINES IN THE NORTHWEST energized in recent weeks include: (1) the $6.7-million, 80-mile Big Eddy-McLaughlin line carrying power from the Dalles dam and non-Federal plants east of the Cascades, and (2) the $12.8-million Rocky Reach-Maple Valley line delivering power to the Puget Sound area. Both are 345,000-volt lines, though the new line serving Portland and Willamette Valley load centers was initially energized at 230,000-volts. The Rocky Reach-Maple Valley line, second longest 345-kv line in the U. S., is one of two in a $22.5-million BPA complex scheduled for completion this month.

BPA TEST STEP TO 500-KV transmission is being taken on the Big Eddy-McLaughlin line, where two 4,000-foot sections will provide operating experience on creep and vibration experience under varied load and weather conditions. Five companies (Alcoa, Kaiser, Anaconda, Olin and Reynolds) are supplying the 2.1-inch diameter test conductor--some reinforced with steel strands, but without paper filling to meet BPA specs. Though these test sections are designed for 460-kv capacity, 500-kv transmission is already being considered for carrying John Day dam power by 1967-68.

STATE USE OF HANFORD POWER was a new goal of public power leaders in the Northwest, after state and federal agency representatives agreed last month on the desirability of pursuing this alternative to the defeated federal construction. Washington state sponsors built up an optimistic head of steam in the face of numerous legal and technical obstacles, but, Northwest private power spokesmen--noncommittal for the record during the recent hassle in the Congress--were equally pessimistic about this prospect.

CELEBRATION: FIRST ELECTRICITY!--That's right, the remote community of Elk City, Idaho, deep in the Nez Perce National Forest, was energized last month via a 50-mile line from Washington Water Power.

KEY TO "UNDERGROUND DILEMMA" for Northwest utility companies venturing into residential service with positive approach is investment ratio. Portland General Electric and Puget Sound Power and Light Co. reported to a NELPA conference last month that they are in the clear as long as they don't invest more in underground distribution facilities than they do in comparable overhead. Rate departments of these companies watch this closely.

B.C. ELECTRIC TAKE-OVER by Provincial government was made possible by the once private utility's failure to develop a strong base of public and industry support, says its former general sales manager, Otto Zwanzig. In a post-mortem appraisal for a recent NELPA conference, however, he reported that a survey now shows an awakening opposition--where 53-percent of a public cross section were favorable prior to take-over, only 38-percent are now pleased with the present operation . . . and only 28-percent are pleased with the way the take-over was accomplished. His advice to private power companies: enlist the understanding of local communications media before crises arise.

EL&P
ELECTRIC LIGHT AND POWER
THE MAGAZINE OF ELECTRIC-UTILITY TECHNOLOGY

EVALUATION OF TIE CAPACITY BETWEEN POOLS OR SYSTEMS

New analytical procedure utilizing high-speed computer permits complete evaluation of economic worth of tie capacity as measured by benefits received.

By H. E. LOKAY, Sponsor Engineer and
M. S. SCHULTZ, Asst. Sponsor Engineer,
Electric Utility Engineering Dept.,
Westinghouse Electric Corporation

YSTEM INTERCONNECTION PLANNING represents one of he current areas of intensive study n almost every utility company toay. For some companies this inolves new ties to neighboring utiliies; to others it's reappraising the apacity of existing ties. Now there s certainly justification for this mphasis because it can represent ubstantial savings to both comanies or pools in the form of postoning the next generating-capacity ddition, sharing spinning reserve equirements, enabling economy urchases, and ultimately having a ermissible reduction in the total equired installed reserve.

To evaluate the tie capacity that an be installed between two sysems or two pools requires a judiious measure of the benefits proided by the interconnection. These enefits can then be compared with he cost of the tie to determine its conomic worth. One important enefit obtained from interconnectng two systems is the possible reuction in installed reserve, while till maintaining the same service eliability standard. This is achieved y taking advantage of the daily, easonal and annual load diversity etween systems, the diversity of cheduled maintenance, and the ow probability that major generatng units will have simultaneous utages on each system. This benet generally determines the tie capacity rating. Other benefits, such as sharing spinning reserve requirements, economy purchase between systems, possible reduction in over-all transmission facilities, and possibly power wheeling will also provide tangible savings. While these benefits can represent substantial savings, they in general do not determine the desired mw rating of the interconnection.

Determining the size of new generating capacity and when it is required is not an easy problem even when a single system is considered. But when interconnections are also included the problem becomes more complicated, because of the different system characteristics, and advantage should be taken of these differences to achieve maximum savings. The problem is best solved with probability mathematics.

To determine the reduction in required installed reserve permissible to still maintain each individual system's (or pool) service standard requires that the probability of having insufficient capacity (load loss) be calculated for each system throughout the study period. Since the reduction is a function of the tie capacity, similar calculations are required as different magnitudes of tie capacity are studied. As tie capacity increases, the risk of probability of load loss for each system should (may not always) decrease. Calculations to determine the probability of insufficient capacity—assuming the two systems are completely integrated—should be made, and this probability value or risk level will represent the best that can be obtained as greater and greater tie capacity is added.

The above described procedure is not new. However, the calculations required to determine the probability of load loss for a system have been complicated and time consuming, even when using the high-speed digital computers. General studies and future study period lengths were therefore purposely limited.

Follow Analytical Procedure

Recently, as a part of the "Powercasting" program, a new analytical procedure has been developed, using high-speed computers for the probability of load-loss calculations, where the time and cost of the computers do not prohibit studies of many tie ratings and long future study periods. The computer program automatically calculates the probability of load loss for each system and for both systems assuming they are fully integrated. It recognizes the system with the highest probability of load loss and then begins to add tie capacity in specified mw blocks until the standard acceptable risk is reached. For each step the probability of load loss is calculated for each system. The tie capacity is first assumed to be firm capacity always available, and then the new probability of load loss is modified to include the probability that the full tie rating will not always be available when required. General planning curves can then be developed, such as:

1. System risk of load loss in years per day vs. each month of future study period.
2. System risk of load loss in years per one day vs. tie mw capacity for the annual peak load month or highest risk level month.
3. System risk of load loss in years per one day vs. percent required reserve or required installed mw for the annual peak load months.
4. Tie capacity required vs. each future year to maintain a specific risk of load-loss level (includes new capacity additions).

(Throughout this article tie capacity is defined as the mw of power that can be obtained from one system (or systems) through any number of tie points to another system (or systems) when required. It does not mean the mw rating of a particular transmission line or lines, but the amount that operating procedures and system characteristics will let flow between systems when required. Therefore, the same interconnection could have a different rating for each system.)

Very frequently the thermal capacity of a transmission line is much greater than the mw which system characteristics will permit to flow, because of the large steps between ratings for the few transmission voltage levels used by a system. This may be especially true when a system has ties to several systems. Therefore, following any probability calculations to determine tie-capacity requirements, detailed load-flow transmission studies are required to determine tie points and operating procedure for receiving the required mw over the tie.

It is not the intent of this article to describe the mathematical details of how the probability of load loss or the risk of losing load is calculated. The procedure is an analytical method which calculates directly the risk of losing load—generally expressed as years per day of outage. The method requires as input information for a system the individual month's forecasted peak loads, each month's standard deviation of weekday peak loads, individual unit sizes, individual unit outage rates, unit type (unit or common header), unit seasonal deratings (water limitations), unit maintenance requirements, and the existing interconnection tie capac-

TABLE II
CAPACITY DATA FOR SAMPLE STUDY

System A					System B				
No.	Rating	Outage Rate	Maint. Weeks/ Yr.	MW-Weeks Maint.	No.	Rating	Outage Rate	Maint. Weeks/ Yr.	MW-Weeks Maint.
1	75	.025	4	300	1	150	.025	4	600
2	60	.025	4	480	2	120	.025	4	960
1	55	.024	4	220	1	110	.025	4	440
5	50	.023	4	1000	1	100	.025	4	400
6	40	.021	3	720	2	100	.024	4	800
5	30	.020	2	300	1	100	.010	1	100
6	25	.018	2	300	2	80	.023	4	640
4	15	.015	1	60	3	80	.010	1	240
TOTAL 30	1100	—	–	3380*	4	60	.021	4	960
		*MW-Weeks Per Year			1	60	.010	1	60
					4	50	.021	4	800
					1	50	.010	1	50
					4	30	.020	3	360
					1	30	.010	1	30
					5	20	.015	2	200
					5	20	.010	1	100
					TOTAL 38	2220	—	–	6740*
							*MW-Weeks Per Year		

NOTE: Maintenance scheduled to levelize risk *within* any calendar year.

TABLE I
LOAD DATA FOR SAMPLE STUDY

	System A		System B		Integrated Systems	
Month	Monthly Peak-MW	Std. Deviation Percent*	Monthly Peak-MW	Std. Deviation Percent*	Monthly Peak-MW	Std. Deviation Percent*
1	845	3.2	1360	3.2	2170	2.4
2	820	2.6	1360	2.6	2135	2.0
3	800	2.6	1370	2.1	2140	1.6
4	790	3.2	1390	3.2	2210	2.3
5	795	3.2	1440	3.2	2195	2.3
6	805	4.3	1500	3.2	2280	2.5
7	820	5.5	1570	4.3	2345	3.4
8	850	6.8	1630	4.9	2445	3.9
9	835	5.5	1600	3.2	2400	2.8
10	835	2.6	1640	2.1	2440	1.7
11	880	3.2	1750	2.6	2590	2.0
12	925	3.7	1840	3.2	2730	2.5
13	900	3.2	1800	3.2	2675	2.4
14	870	2.6	1700	2.6	2540	2.0
15	845	2.6	1650	2.1	2450	1.6
16	830	3.2	1620	3.2	2425	2.3
17	830	3.2	1620	3.2	2410	2.3
18	860	4.3	1650	3.2	2480	2.5
19	885	5.5	1720	4.3	2570	3.4
20	900	6.8	1760	4.9	2615	3.9
21	880	5.5	1750	3.2	2600	2.8
22	885	2.6	1720	2.1	2580	1.7
23	935	3.2	1810	2.6	2720	2.0
24	1000	3.7	2000	3.2	2940	2.5

*Percent based on average weekday peak.

y available. Calculations are ade on a one-quarter-month basis order to properly include the aintenance requirements and sea-nal water limitations. The four uarter-month probabilities of load ss are then combined to obtain onthly risk.

The probability values expressed s "so many" years per day of outge for a particular month is the sk of load loss assuming a year is omposed of 12 months of identical robability equal to that particular onth.

$$\text{isk (years per day)} = \frac{1}{(\text{Probability in month})\ (12)}$$

This monthly risk value (based n the probability of the poorest onth) is used as the criterion of ystem performance for the study iscussed in this article.

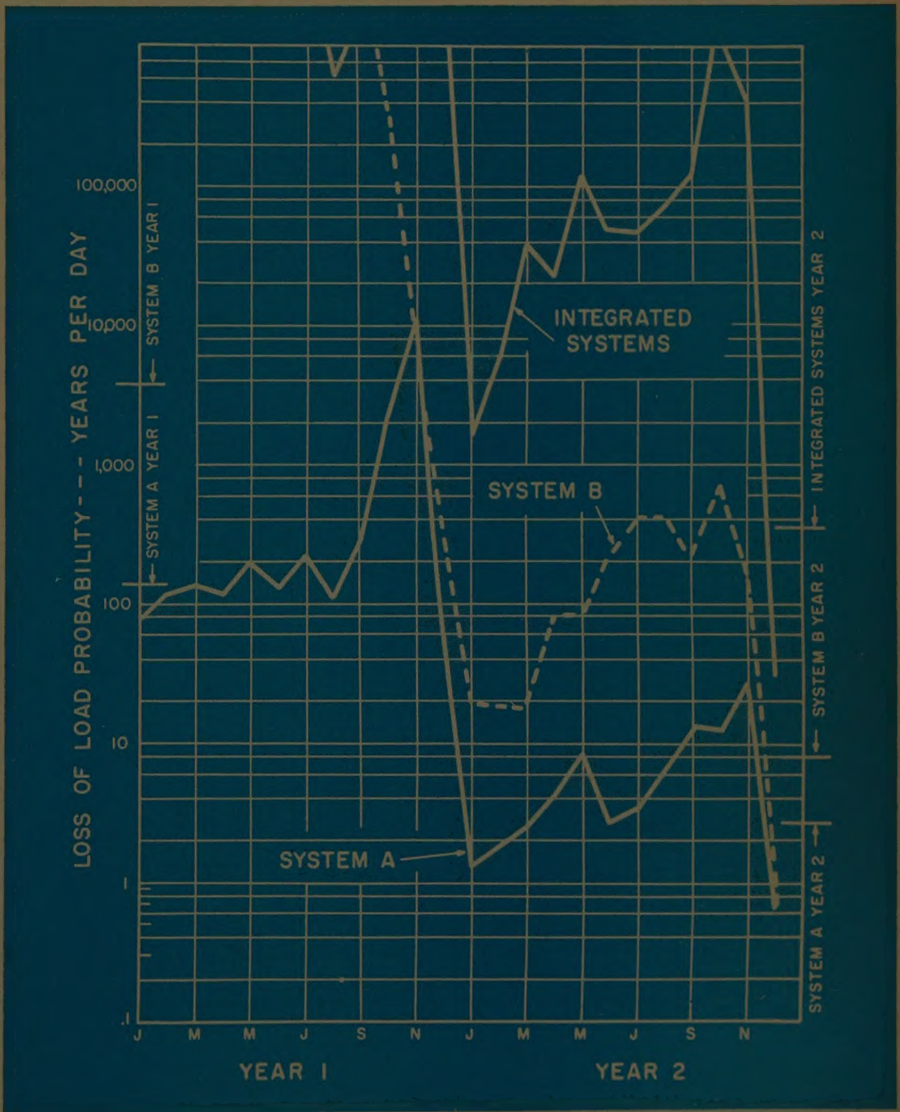
In addition to the monthly risk, ne yearly risks can also be given. hese are determined by adding the robability of load loss for each onth and then inverting to obtain isk in years per day of outage. In nis method the yearly risk is an verage of the risk for the few poor onths, since the months with a ow probability of load loss conribute very little. It is possible to se yearly risk as the basis for sysem performance, and, when it beomes too poor, generation is added. he authors prefer the monthly isk values as a planning guide, beause the individual months when isk becomes too high are deterined. More definite information is btained, which is especially imortant if system load characteriscs are changing. The influence of ne changing load characteristics an be followed more closely for its ffect on system risk of load loss. lso, since no maintenance is genrally taken in the month with ighest risk, the monthly risk value ives a truer picture of the reserve ituation. It is not affected by the uman decision to remove capacy from the system, as is the yearly alue.

To best illustrate how a study an be conducted and to illustrate ne effect interconnection capacity will have on the individual systems, a sample study is described. Two systems are to be interconnected when one system is twice the size (mw load) of the other. Both have winter peaks, but each has slightly different load characteristics.

Each system has a typical complement of unit types and ratings. Reasonable unit outage rates, maintenance requirements and monthly load characteristics were used. The study period was two years; however, for the first year each system had sufficient capacity to have a lower than standard (acceptable) probability of load loss. In the second year, capacity had to be added to each system either as new generation or interconnections. It is assumed that interconnections will be added to postpone adding new generation.

Table I lists the individual monthly forecasted peaks for a two-year future period and the individual monthly load standard deviations. The standard deviation values were assumed after analyzing daily peak loads for the individual months of several actual operating companies. Also listed are the load and standard deviations for the two systems completely integrated. Both systems were arbitrarily made winter-peak systems.

The complement of generating units for each system with their corresponding outage rates and maintenance requirements are listed in Table II. The installed capacity for each system represents a ten percent installed reserve during the predicted peak load month of the second year. No seasonal derating was assumed. No attempt is being made to identify the individual units between unit-type steam, common-header steam, hydro, gas turbines, etc. It can be as-



g. 1—Month-by-month values of system probbility of load loss for two years for System A, ystem B and both systems completely inteated. Yearly risk values are shown at side of art.

sumed, however, that the units with the lowest outage rates could be either hydro or peaking type plants.

It is assumed that no tie capacity exists between the two systems, and the objective is to evaluate the effects of different tie capacities. As a base point, the risk is first calculated for the two systems alone. The results are shown for the 24-month period as the System A and System B curves in Fig. 1. No new generating capacity is added in the two years; consequently the risk increases the second year.

The yearly risk values are also indicated in Fig. 1. It can be noted that in both systems the yearly risk is made up almost entirely of the values for the high-risk months.

A plot of the monthly risk value with both systems integrated is also shown in Fig. 1. Complete integration assumes unlimited tie capacity, and the risk value represents the maximum benefits in risk improvement that can be obtained by interconnecting. Using a typical system design standard of one day in 12 years, or 12 years per day, neither falls below this threshold value any month the first year. During the second year both fall below acceptable. The plot of the two systems integrated shows the acceptable probability of load loss is never exceeded. Therefore, this indicates that an interconnection can avoid new generation additions the second year. Recalculating individual system risks assuming different tie capacities will indicate what tie capacity is required to reduce the risk of both systems to the acceptable value.

Fig. 2 is a plot of the system risk levels for December of the second year (highest risk month) with different tie capacities. The solid curves assume the mw rating of the tie is alway available when required. The dotted curves include the probability that the entire mw value is not always available, based on the risk level of the tie source system. It will be noted that each system requires different amounts of tie capacity to achieve an acceptable risk level, because of their initial risk level and system size. System A requires a tie capacity of 60 mw, and System B requires 100 mw.

The improvement of risk per mw of increased tie capacity is greater for the smaller system (System A) because the tie capacity is a much greater percent of the system's total generation or load.

The benefits of the interconnection can be shown by comparing the installed capacity required with and without the tie. Fig. 3 shows the installed capacity required the second year for the two systems completely integrated to maintain any risk level. The dotted curve represents the sum of the installed mw required if they were independent and both had the same risk level. Maintaining a risk of 12 yea per day, the total installed capacit can be reduced as much as 190 mw depending upon the capacity of th tie.

The percent reserve required th second year to maintain any ris level is shown in Fig. 4. Each curv is based on its own particular pea load. The System A & B curves ar for complete system independenc Again, maintaining a risk level of 1 years per day, the installed reserv required for Systems A & B woul be 16.4 and 15.1 percent, respectively. These can be compared to th ten percent installed reserve and th required 100 mw tie (Fig. 2) to obtain this risk on System B. If th systems were completely integrated, an 11.2 percent reserve i required based on the combine peak load. The value of 11.2 percent installed reserve, at first, appears low for systems having a tota load about 3000 mw. The low valu is due to the many smaller uni sizes that make up the two combined systems and also to the reduced percent load standard deviation of the combined systems. Th largest unit is but five percent o the peak load, while in a single system a unit rating in the order of te percent or more may be expecte A large unit down will have a muc greater effect on risk level than smaller unit.

The percent load deviation of th combined systems is reduced because the combined standard deviation is obtained (a reasonabl approximation) from the squar root of the sum of the individua system deviations squared. In future system operations with the interconnection, as larger units ar alternately added between system the required percent reserve woul be expected to increase, but not a high as the systems operating independently.

The slightly larger percent reserve required for System A is du to the combination of unit outag rates, maintenance scheduling, an

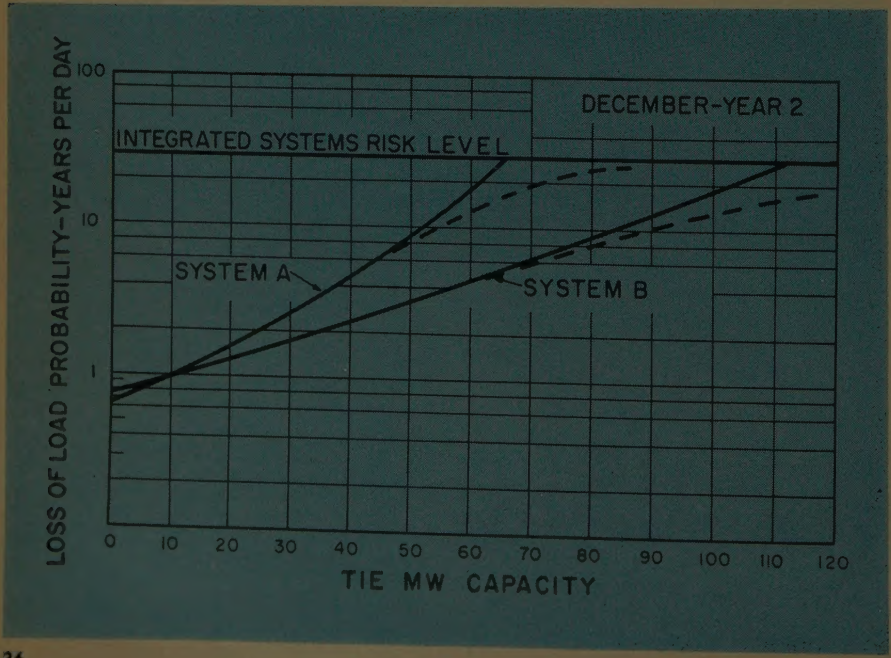


Fig. 2—Improvement in risk of load loss f Systems A and B with increasing tie capaci in December of the second year. Solid cur assumes tie mw value always available. Dott curves include probability that entire tie m value is not always available based on ri level of tie source system.

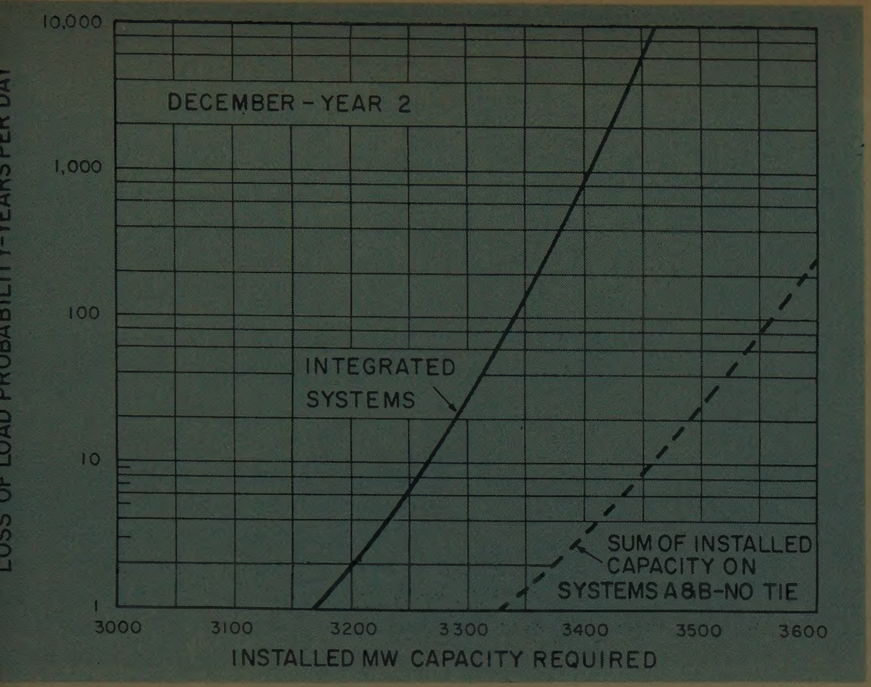


Fig. 3—Curves of risk load loss vs. required installed capacity for the sum of Systems A and B with no tie when both systems have the same risk and for both systems completely integrated in December of second year.

larger monthly load standard
viations. Only a detailed study
the factors would point out the
gnitude of their effect.

Can Postpone New Generation

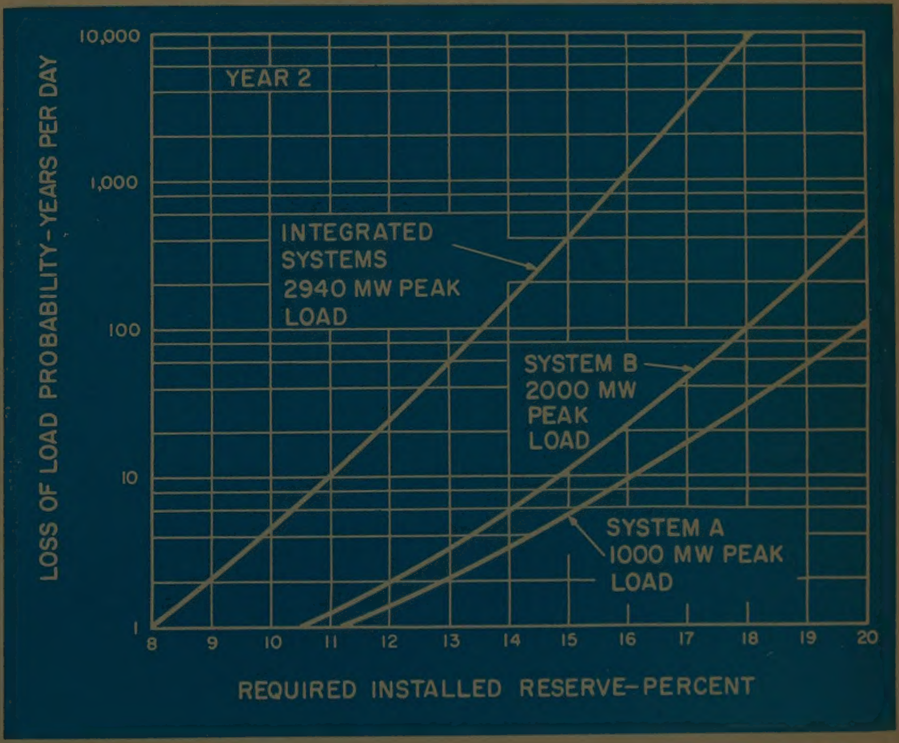
This study illustrates two sys-
ns which, if independent, would
required to add new generation
the second year. However, if
ese systems interconnect with a
0 mw tie, they both can take ad-
ntage of the diversity between
stem loads, diversity in system
aintenance, and the low proba-
ity of simultaneous outages of
ajor units to reduce each system's
k of load loss to acceptable. New
neration can be postponed at least
year.

The study could be continued to
termine the additional tie capa-
y for the next year, if required,
hen new generation is added to
st one system. Since System B
termined the tie capacity require-
ents in year two, it should install
e next unit. This will result in the
nimum change in tie capacity re-
irements between years two and three. Continuing the study for additional years, a plan of tie requirements including alternating new generating units between systems could easily be developed.

Summary Comment

Tie capacity can be evaluated by the reduction in combined installed reserve it permits or the amount that risk of load loss for either system is reduced. The ability for two systems (or pools) to share installed reserve is a function of the probability of load loss for the systems completely integrated. If for any year the integrated systems' probability of load loss does not exceed acceptable, while the individual systems' risks do, adding tie capacity will defer new generation of the two systems sharing installed reserve. The relative sizes of the two systems have an important effect on the amount of improvement possible when interconnecting, but unless one system is so large that it dominates the combined systems, both will show significant reduction in risk. With similar risks before the interconnection, the larger system will dictate the tie capacity requirements to have both improved to some specific risk value.

The procedure can be followed at reasonable cost and effort. Once the future tie capacity is determined, its cost can be compared to the value of benefits received—postponing of new generation, economy energy transactions, sharing spinning reserve, etc.—to completely evaluate its economic worth.



. 4—Probability of load loss vs. required alled percent reserve for Systems A and B rating independently and for both systems npletely integrated in second year.

New Methods SPUR INTEREST IN RESIDENTIAL UNDE

By BERNARD W. HAFELI, Underground Lines Department, The Detroit Edison Company

UNDERGROUND residential distribution systems are not entirely new with our Company. In the late 1920's and very early 1930's we built several such systems. These were conventional with the construction practices of the times, and composed of concrete encased duct runs, manholes, above-grade transformer vaults, paper and lead primary cables terminating in compound-filled potheads at vaults and poles, rubber and lead secondary mains and junction boxes.

This type of construction was dormant until the late 1940's and early 1950's when there was another little flurry of activity. Some of the construction practices had changed and above-grade transformer enclosures were used along with secondary service pedestals. Concrete encased duct runs were replaced with direct burial primary and secondary cables covered with clay cable tiles. Primary cables were terminated in compound-filled potheads on poles, but terminations without potheads were made directly to primary trainers of overhead distribution transformers in above-grade enclosures. The secondary cable was rubber and neoprene.

Present Trend

Early in 1957 our present standards for underground distribution systems began to take shape. This came about as a result of a Task Group Study made by representatives of our Electrical System, General Engineering, Sales and Underground Lines Departments. One deviation from earlier plans for this type of construction is that all trench and backfill for the installation of the system is furnished by the subdivision developer.

A natural step in the exploration of this feature was consultation with the Michigan Bell Telephone Company. As a result of several meetings with them, a tentative agreement covering joint trench use was worked out. This temporary joint trench use agreement has proven to be mutually advantageous and the majority of jobs have been joint trench occupancy with the Michigan Bell Telephone Company. Up until the present time, we have built 11 subdivisions and five trailer parks under this arrangement and three trailer parks without joint trench occupancy. Both 4.8 and 13.2-kv primary distribution cables have been installed in joint trenches.

Description of System

The system that developed from

Editor's Note:—This article is adapted from a paper presented by the author at the 83rd meeting of the Transmission and Distribution Committee, Edison Electric Institute.

Fig. 1—Typical residential underground distribution plan.

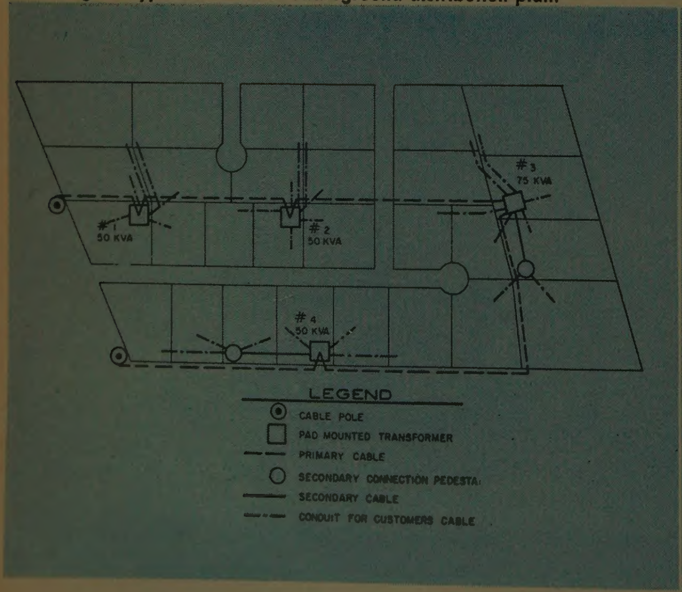
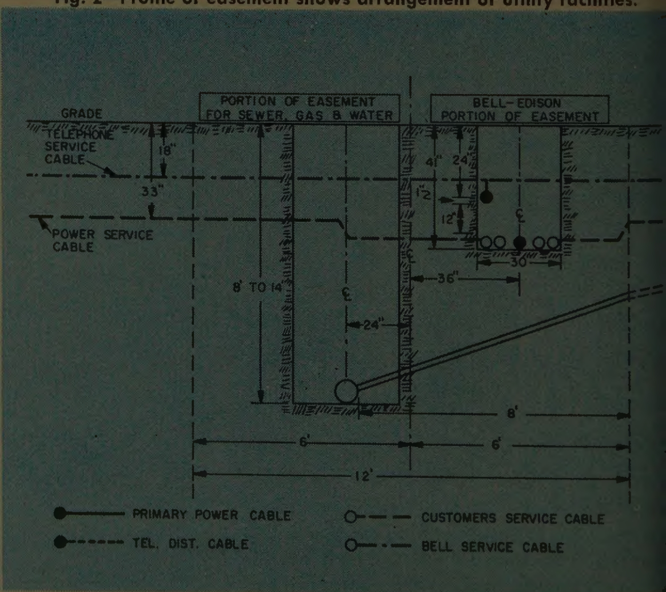


Fig. 2—Profile of easement shows arrangement of utility facilities.



oint-occupancy trenches, pre-arranged
ork schedules, simultaneous installa-
ons avoid duplication of effort, un-
lanned dig ups; creates atmosphere of
single packaged job.

ROUND SERVICE

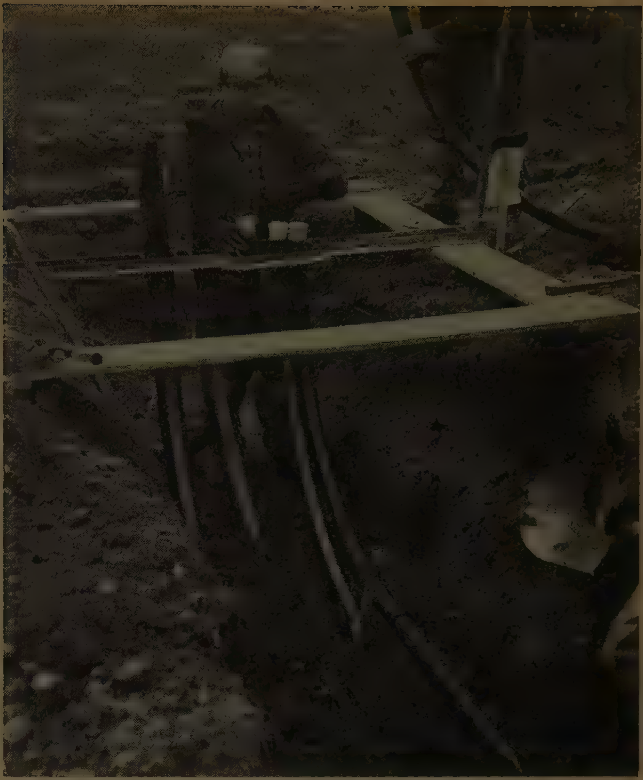


Fig. 3—Jig helps set direct-burial sweeps at transformer mat locations.

ur Task Group study generally
llows the layout shown in Fig. I.
consists of a single phase pri-
ary loop from cable pole to cable
ole, in and out of above-grade
ansformers with an open point in
e loop near the center of the sys-
m. The design is predicated on
ubdivision units of about 100-lot
crements. The primary cable on
3.2-kv systems is IC No. 4 rubber
nd lead with a IC No. 4 600-v rub-
er neoprene neutral. On 4.8-kv
ystems two IC No. 2 rubber and
ad cables are used. The cable is
rminated at the transformer
ushings and cable poles with sim-
le terminals without potheads.
adial secondary mains to service
edestals are 600-volt rubber and
eoprene and are minimized wher-
ver possible. All primary and sec-
ndary mains are installed in
eavy-wall, direct-burial fiber con-
uit without concrete encasement
xcept where road crossings are involved. Either galvanized rigid conduit or concrete encased fiber is installed across the entire road right of way. Direct-burial conduit is also installed in the easement for service cables to homes which are not immediately adjacent to transformers or service pedestals.

Service cable from the house to the connection point at the transformer or service pedestal in the easement is installed, owned and maintained by the customer. Except for the portion in the easement, which is contained in the direct burial conduit, service cable is buried directly in the ground with a one-in. by six-in. treated board load above it for mechanical protection.

Where small subdivisions are encountered, the radial primary system is used. However, the restriction is made that not more than 25 lots are to be served. In areas where the distribution voltage is 13.2 kv, it is further stipulated that both conductors be fully insulated as phase conductors.

Three-phase systems are not ordinarily installed. We have built only two of them, and in those cases special arrangements were negotiated between our Sales Department and the subdivision developers.

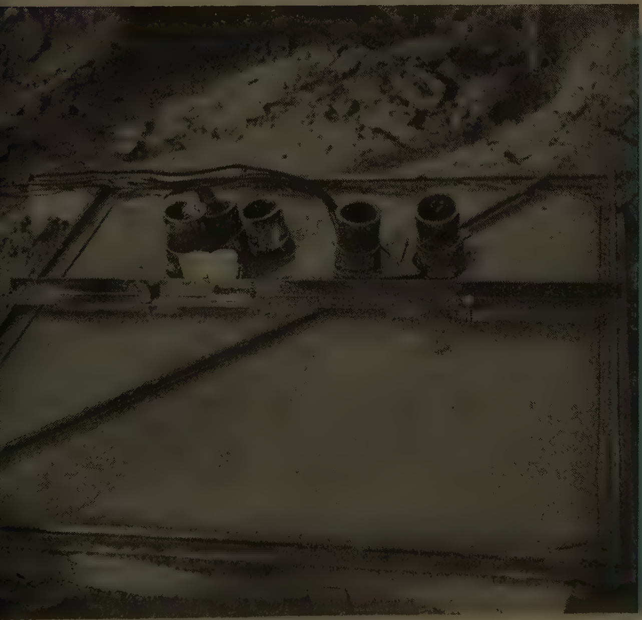


Fig. 4—Transformers anchor bolt and concrete form-leveling jig.

Construction Sequence

Construction of these underground distribution systems is comprised of two distinct phases—conduit installation phase and cable installation phase. This is logically in keeping with the normal breakdown of other types of underground cable construction in our company.

The conduit installation phase takes place as follows:

1. A joint meeting is held at the

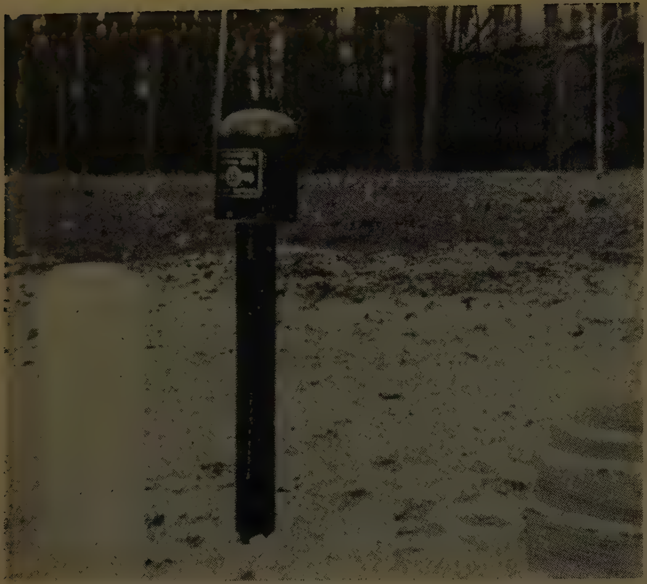


Fig. 5—Reinforced concrete pipe service pedestal base.

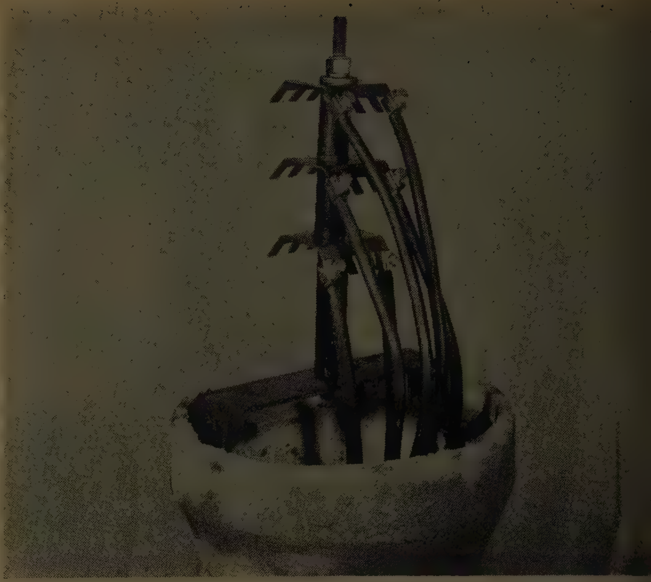


Fig. 6—Secondary bus at single-phase service pedestal.

construction site with representatives of our Underground Lines and Sales Department, The Michigan Bell Telephone Company, the land developer, and his excavating contractor. At this time we make certain that final grade along the route of the system is established, and that lot stakes are in place; we agree upon a starting time and a starting point that is mutually satisfactory for both The Detroit Edison and The Michigan Bell Telephone Companies.

2. The direct burial conduit is laid, and transformer mats and service pedestal bases are installed to complete this phase.

The cable installation phase covers the following:

1. Primary and secondary main cables are pulled.

2. Transformers are set, service pedestal buses and covers installed, primary terminals and secondary main connections are made.

Illustrations show field practices presently in effect on this type of construction.

Joint Trench Occupancy

Our construction experience so far with joint trench occupancy has been highly satisfactory. We have had difficulties and we expect that we will have more in the future. However, joint trench occupancy not only encourages close coordination of construction between the two companies but actually forces it. We feel that it has a number of advantages:

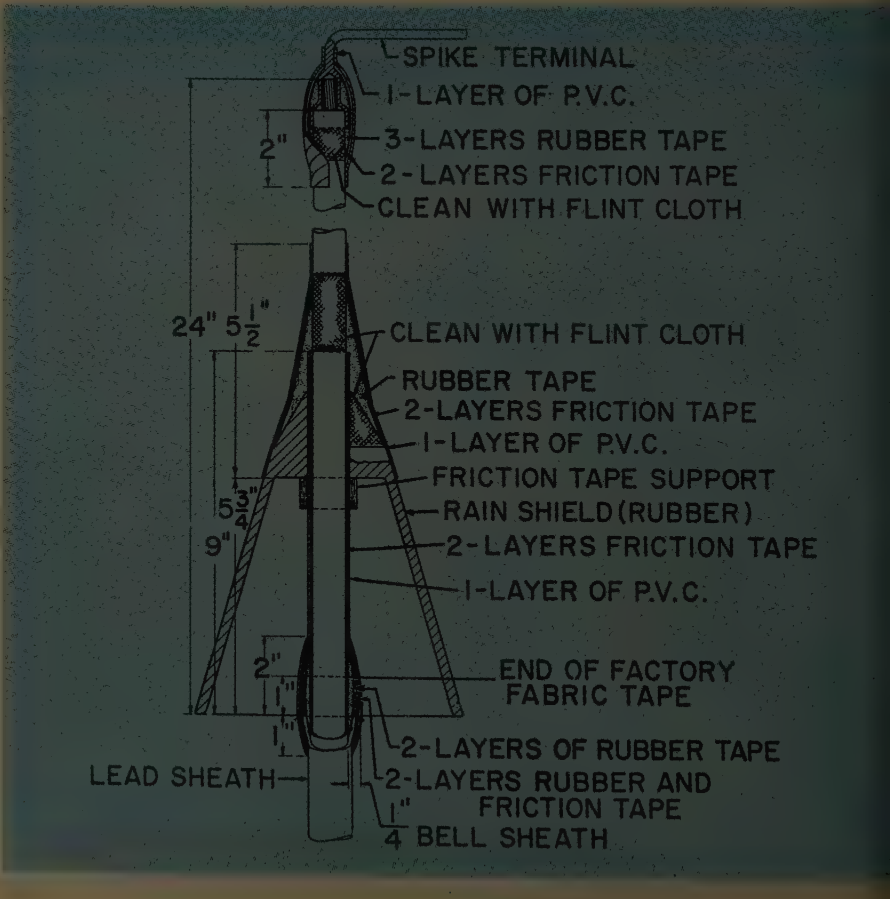
1. Performance of the entire trenching operation at one time sets the stage for eliminating dig ups of each other's plant equipment.

2. A more attractive package is presented to the developer because of the single trenching operation.

3. It creates an atmosphere of single rather than two separat construction jobs and gives eac company better appreciation of th other's problems.

An interesting by-product ha resulted from our underground residential distribution constructio work. A large number of our pri

Fig. 8—Details of 13.2-kv primary cable terminal on pole.



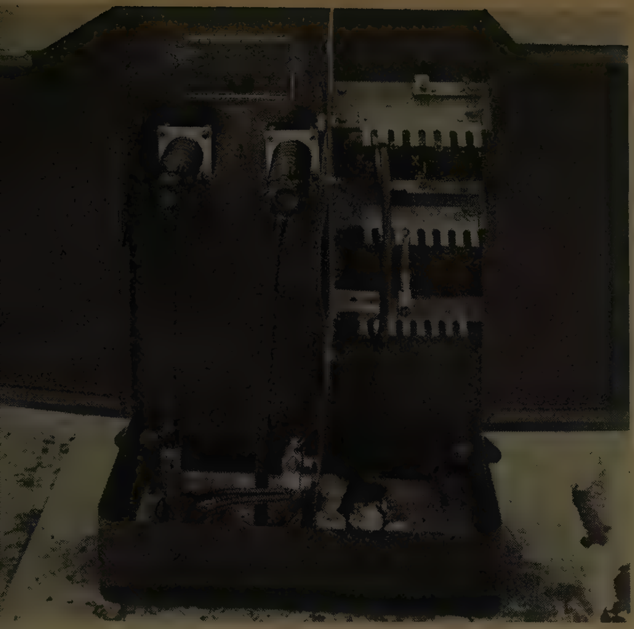


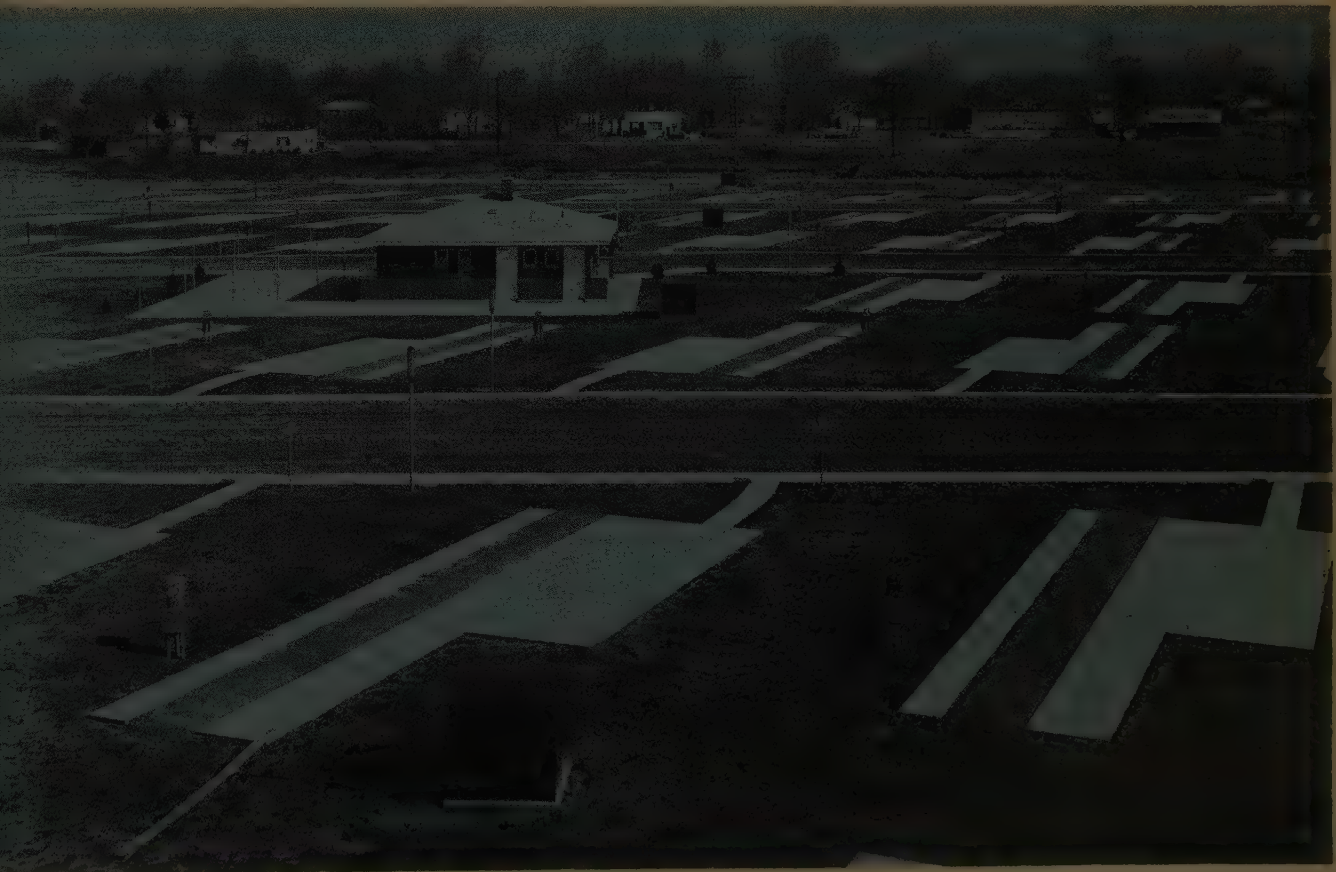
Fig. 7—Primary and secondary transformer terminals.

ary voltage customers are served th an overhead primary feed to transformer cluster pole on their operty. The cable-fed, above-ade transformer has proven to a natural substitution for the erhead-fed transformer cluster le on this type of service. Its pularity has been growing by leaps and bounds and in recent months many installations have followed this pattern. The desirability of this type of installation from the customer's standpoint stems from many of the same advantages found in subdivision and trailer park underground distribution systems.

Many of us concerned with the construction phase are at least a little bit enthusiastic about this type of work. Although we are not experiencing a building boom in our area, we are still optimistic. A large number of developers are interested but on a relatively small scale and in custom built home areas.

The amount of construction carried out so far has been significant, but is only a small portion of the construction work load. This is not unusual at this stage of development because new methods generally start this way. We draw enthusiasm from the acceptance of this type of construction evidenced not only by transformer and related equipment manufacturers, but also from the general atmosphere of acceptance found in other departments within our company. The 19 jobs completed so far would never have materialized if our present system and methods of construction had not been available. We are looking forward to an ever increasing application of underground distribution systems.

Fig. 9—Underground distribution system at Chesterfield Trailer Park, using techniques described.



Conductor failure on 69-kv line in northern Montana benchland area after only four-year service period prompted extensive field investigation and adoption of corrective measures.

Deadly CONDUCTOR VIBRATION SUBDUED

By DONALD B. GREGG, Montana Power Company

DURING A BLIZZARD in northern Montana one night in January, 1959, the Montana Power Company discovered — the hard way — its first serious case of vibration trouble on a transmission line.

The line in question was only four years old, having been constructed in the spring of 1955, yet we found that a tie wire had worn in two, and had let the conductor fall. An emergency inspection of the conductor supports on the following day revealed that about 30 percent of the ties were either broken or badly worn on this 17-mile, 69-kv line in typical northern Montana benchland.

The extreme wear found in so many of the tie wires and accompanying abrasion of the aluminum-alloy Preformed armor rods suggested progressively serious trouble in the future. This prompted us to undertake a "crash" investigation program to learn why this particular line was in trouble and to economically correct the trouble if we could. Since our rural-distribution lines in the same general area had reportedly suffered few ill effects from vibration, we felt that this line was somehow a freak.

The following discussion is an informative report of what we found, what we did, and how we corrected the problem.

As background information, the area is subject to almost continual winds of velocities up to 70 mph and a temperature range of about 160 degrees—from −50 F to 110 F. The line is of single-pole construction, runs north and south, and was designed around the same general parameters as all our other 69-kv lines in the state. Only passing thought was given vibration problems during the design stages because such difficulties were not usually evident throughout our system.

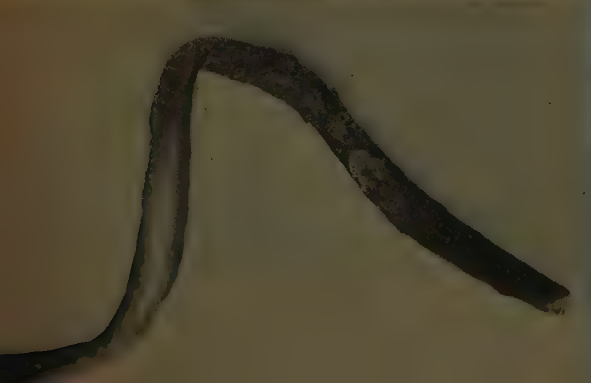
Conductors are #2-7/1 ACSR supported on line-post type insulators, protected with aluminum-alloy Preformed armor rods and tied with #6 soft aluminum tie wire in a one-piece Alcoa double-top tie pattern. The ties were applied neatly, consistently, and as tightly as possible without the use of tools. A #6 3-strand HTC 130 steel static wire is protected at clamp points with steel Preformed armor rods and apparently has suffered little vibration damage. Conductors are designed for a maximum tension of 50 percent of ultimate strength in a 600-ft ruling span under NESC (5th Edition) Medium Loading, resulting in an initial unloaded tension at +60 F of about 17.5 percent of ultimate. The static wire is designed to an initial sag at +60 F of 80 percent of the corresponding conductor sag, which results in an NESC Medium Loading of about 40 percent of ultimate.

In the average 400-ft span (only one span exceeds 425 ft), the conductor tensions after installation at the initial tension of 17.5 percent of ultimate should be about 26.5 percent of ultimate at 0 F initial and 41.0 percent of ultimate under Medium Loading. These figures assume rigid supports and no tie slippage and indicate a slightly more conservative design than that first assumed for the long ruling span.

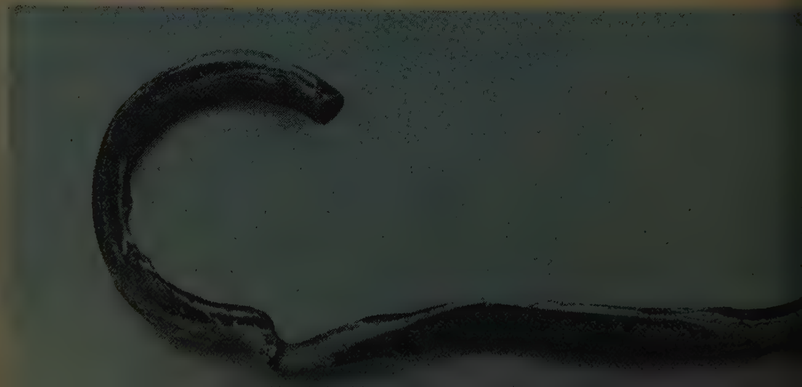
Field reports from an emergency re-tying program, immediately following the discovery of extensive damage, showed that the damage to ties and armor consisted chiefly of abrasive wear; however, some fatigue damage was undoubtedly suffered by the tie wires—at least the ones which broke. In some cases, the end buttons of the tie had beaten and worn entirely through the armor and were damaging the conductor. In other cases, the end buttons failed first and were found rattling around in mid-span. Another type of tie failure occurred from abrasion with the insulator at the first button position of the tie; however, no definitive pattern could be found among the types of tie failure. Despite this damage to ties and armor, spot checks of the conductor under the armor showed no visible deterioration. The cross-arm hardware was generally loose, though not seriously so, undoubtedly because spring washers and MF locknuts were used.

Search for Causes and Cures

Armed with knowledge gained from the inspection, we began a search for causes of and cures for



Close-up of typical end button of double-top tie shows left-hand end worn to a feather edge.



Close-up view of first button near insulator. Relatively straight portion is the beginning of section in tie groove of insulator.

Two typical pieces of No. 4 soft aluminum tie wire removed only five weeks after re-tying. (Nicks at right were not caused by abrasion or fatigue, but by hot stick tools.)

ne trouble. A metallurgical analy-
is of the tie wires precluded the
ossibility of a bad batch of tie wire.
n examination of the damage re-
ealed no "pattern" which could be
elated to tying inconsistencies
few as they were), span length,
upport elevation, or terrain pecu-
arities. A search of the weather
ecords revealed nothing unex-
ected; the winds blew 90 percent
f the time and averaged 9.7 mph
luring the four-year life of the line.
Io noticeable change in weather
attern had taken place in the four
ears, nor had any radical change
ccurred in random four-year aver-
ges. Thus, we could find no con-
lusive evidence to explain why this
articular line was in trouble, when
thers in the same area (usually
vith higher conductor tensions)
eemed to be safe.

Possible cures for the damage
vere to (1) change the pattern of,
r eliminate, the troublesome ties,
nd (2) eliminate the vibration.
The first possibility presupposed
hat little damage was being done
o the conductors under the armor;
supposition we could not support
rom the very few spot checks
nade. Further, a tie pattern which
ould be made "vibration-proof"
vas beyond our imagination, and
hanging to clamp-top insulators on
"hot" line was considered to be
oo costly.

Only two possibilities seemed
ractical for the elimination of vi-
ration. We could reduce conduc-
or tension. This would be costly,
nd it would be difficult to deter-
nine the required amount of reduc-
ion. This left us with the simple
roblem of wholesale damping on
he line, if we could find an effec-
ive damper which would not itself
lamage the conductor. One reason-
ble possibility was the new free-
esponse spiral vibration damper
eing developed at that time by
Preformed Line Products Company. Its lighter weight, less concentrated point of action, and lesser cost than other types encouraged our investigation of its expected effectiveness in the field by comparing its performance over a short test period with field-proven success of other types of dampers. Comparable performance over a limited set of conditions would allow justification of wholesale application of the new damper despite many unknowns about its long-time field performance.

The problem of portable, self-contained instrumentation for use on an energized line was solved with a minimum of investment by our communications laboratory. Armed with a transit, a portable anemometer, a thermometer, a reel of monofilament nylon fish line (previously tested to 75 kv over 23 inches without breakdown), three identical four-inch P.M. radio speakers with wire hooks cemented to the centers of the cones, three matched-audio-output transformers, and three low-range, medium-sensitive, a-c voltmeters, we set out to conquer the vibration.

The tests began by installing one spiral vibration damper and one other type damper on two different phases at each of several structures which had experienced severe tie-wire and armor damage. The #4 soft aluminum double top ties, which had been installed five weeks earlier on these structures during the emergency retying program, already showed considerable wear and were again replaced. At one of these structures we threw a piece of fish line over the two differently damped phases and the undamped phase and positioned the lines by visual approximation at the expected anti-nodes of the vibration loops. The wave length was easily approximated after wind velocity and temperature readings were obtained.

Transit checks of the sag had allowed us to obtain the wire tension in terms of temperature more or less directly from the original sag charts for the line. The loop length (i.e.—½ wave-length) is given by the equation:

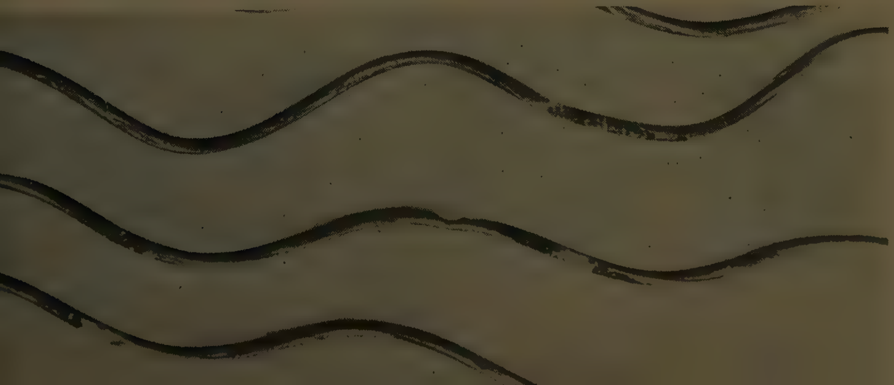
$$LL = \frac{d}{0.37V}\sqrt{T/m}$$

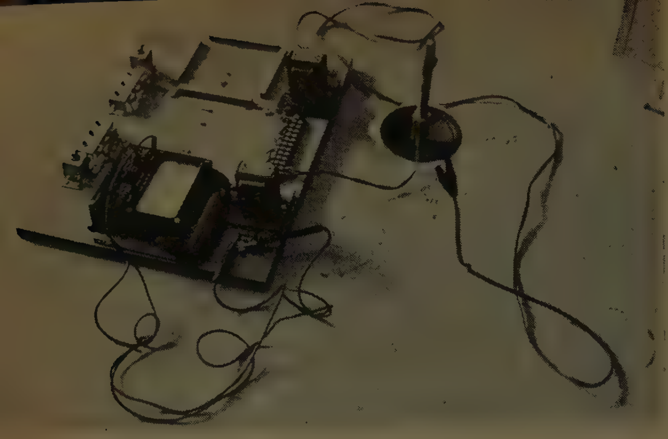
where d = conductor diameter
m = conductor mass/unit length
T = conductor Tension
V = wind velocity

This can be reduced to $LL = K\frac{\sqrt{T}}{V}$ for a given wire, and thus quickly approximated in the field.

				Vibration Voltage Readings		
Temp.	Approx. Cross Component Wind	Pole No.	Span Length	West Phase Undamped	East Phase Spiral	Center Phase Other Type
+76 F	1.7 mph	30	350 ft	4.2 volts	0.0+ volts	0.2 volts
+74 F	1.5 mph	30	350 ft	8.0 volts	0.0+ volts	0.2 volts

Partial set of armor rods showing typical chafing damage.





Mock test setup consisting of speaker suspended from conductor with nylon fish line (not visible) on the right, lead from speaker voice coil to low-voltage winding of audi-output transformer, and low-range a-c voltmeter connected to high-voltage side of transformer. Board accommodates two transformers and two voltmeters.

Close-up of four-in. P.M. speaker used as a transducer. Rod is cemented to center of cone and serves as a mount for strings and light springs which helped support weight of speaker frame and magnet. This was necessary because the paper cone sagged after extended use and limited the voice-coil travel.

The speakers were then suspended on the strings by the hooks cemented to the cones, at a convenient working height, and their voice-coil output was stepped up through the audio transformers and measured as voltage. During the long wait for steady winds conducive to sustained vibration, we were able to confirm reasonable calibration of the instruments by quickly changing speakers from one string to another during short bursts of vibratory action. We also were relieved to find confirmation of our hopes that violent vibrations of the strings themselves would not "read" on the voltmeters.

When steady winds arrived, we were able to better adjust the positioning of the strings for maximum amplitude and obtained good readings of vibration at various structures along the line. Over two different periods totaling several days, we became convinced that the new dampers were reasonably comparable to other types and that all types were at least partially effective in suppressing vibration. However, some combinations of tension and wind velocity produced vehement vibration on "damped" conductors. Typical of the readings obtained are those shown in box.

During the tests, which took place over a six-month period, we had occasion to notice the rapid deterioration of some new tie wires on undamped phases, while damped phases on the same structure showed little or no tie-wire damage.

Add Spiral Dampers Throughout

Having decided to apply the spiral vibration damper wholesale along the line, we further specified retying throughout, using a two-piece pigtail tie, re-armoring where the original armor had been badly damaged (using special, short Preformed armor rods over the original armor), and establishing various control structures with different patterns of ties and dampers. Generally we used only one damper per phase per span, rather than damping both ends of each span. We also installed some spiral dampers without the "pigtail"—or short gripping helix. These were applied with split rubber stoppers to limit their travel.

The damping, repairing, and retying project was done in late fall of 1959. Application of the new damper proved to be easy and fast. It was applied with hot sticks, without excessive reaching and it does not require a wrench.

An extremely heavy frost loading the following winter pretty well bolstered our hopes that the "four undamped years" had spared the conductors themselves of serious damage under the armor rod. That storm loaded the line in question for most of its length with up to 1¾ in. of radial ice under a two-lb wind and the line suffered only one case of conductor failure.

In the succeeding fall of 1960, after a typical year of operation with spiral vibration dampers and new tie wires, we re-inspected selected control structures on the line. Ties were removed on several of these structures and both the tie wire and armor rods were carefully examined for indication of wear. Nowhere on the selected structures was there evidence of the highly progressive wear or abrasion experienced before the application of dampers. Some very slight wear was visible on the ties and was undoubtedly the result of normal wire movement during the year. However, this wear was of little consequence and would require many years of service at the present rate of attrition to become serious. We found the two-piece pigtail tie to be superior to the double-top pattern on the few control structures where both patterns were used, and have developed new tying specifications for our transmission work as a result of this knowledge.

It was interesting to observe that the spiral vibration dampers without the reduced-diameter helix (or pigtail) had, after a period of time, pushed their stoppers out to the

(Continued on page 99)

Typical damped structure with Preformed spiral vibration dampers applied on either side of the armor rods.

INDUSTRY IN CONFERENCE

Iowa Companies Study Government-Ownership Challenge

How to meet the challenge of a 'new emphasis" on government ownership received earnest attention of several principal speakers at the recent annual Management Conference of the Iowa Utility Companies. Setting the tone of the meeting at the outset, Iowa Electric's Duane Arnold, presiding over the initial session, told some 470 conferees that the government ownership program is being carried out with ideological fervor by dedicated people.

The best we are doing now is inadequate, said Arnold. We must not only give the public the best service at the greatest economy, we must win the public's appreciation and do it quicker and better than is now thought possible. We are faced with a fight to protect our heritage that government is created to serve people. Let's not be guilty of creating our own serfdom, he concluded.

Our investor-owned utility companies are unique, said Donald S. Kennedy, OG&E president, in that they alone among the many utilities sending representatives to the World Power Conference are not government owned or operated. But, how long can they remain unique? he asked. Our growth borders on the spectacular, he said, but what about the future? In many ways we are confronted with the law of diminishing returns but, fortunately, this law does not affect our leadership or our selling.

In 10 years our companies will be run by people not now in positions of control. We are the people who must select, train and inspire these future leaders to accept the responsibilities and the sacrifices of leadership, Kennedy continued.

One of the best ways to sell our product, said Kennedy, is to use it ourselves. But, we must sell much more than our product; we must sell our way of life and enlist all company members and stockholders on our PR teams. Then we should listen to the "feedback" to be aware of trouble spots. One doesn't learn much when he's talking, he concluded.

We haven't seen anything compared to what is coming, Milton Kapp, Interstate Power Company president told conferees. Washington is stirring up the cooperatives, telling them they've got to do more, developing huge generating plants and vast transmission grids. We are doing a good job but losing the fight. Through our several industry organizations and publications there are greater signs of our becoming aware, he said, but it's late and we have to act fast.

A recent survey indicates that many of our employees and their wives are not informed about our company activities, about who owns the company, or about our huge expenditure for a nuclear plant, Kapp continued. We have an excellent opportunity to be good citizens locally, he said, but we have to learn how to talk to the people in Washington, then not forget to thank our representatives when they fight the cause for free enterprise.

In the same vein, George Neal, chairman of Iowa Public Service, urged conferees to tell their government representatives that they are tired of paying taxes for far-away projects that "do us no good." Government should be made to understand that everything productive belongs on the tax rolls; this campaign must start at the local level.

Edwin Vennard, vice president and managing director of Edison Electric Institute, revealed results of a comprehensive opinion survey which demonstrated that investor-owned utilities through good planning and hard work have made noticeable gains in public favor. But, right now utility company performance far outweighs their ability to tell about it, he said. He suggested that each company re-examine its policies in public relations, put PR on an equal footing with engineering, accounting and sales, and establish definite objectives for improving understanding and attitudes. Areas in which higher goals are desirable or essential, he suggested, include broader knowledge and understanding of the American economic system, American freedom, the electric power business, and the "Power Issue." Targets of the stepped-up PR programs, he added, should be employees, investors, opinion leaders, and the general public.

Washington Climate

Confirming expressed opinions of previous speakers, Arthur Barnett, NAEC, Washington, D. C., said there is nothing new about the continuous attack of public power proponents, but there is a new urgency about it. While REA's are essentially "private" power companies with a "built-in conscience," he declared, they are actually midway between public and private power and susceptible to the current contention that "preference customers need help which only government can supply."

While the public power group is pushing for a federal transmission grid and encouraging REA loans for generation (including nuclear and pumped storage) and transmission, Barnett continued, congress seems to be in the "middle of the road," making it clear that there is room for collaboration. It is time to think

Harold Rowe, left, Iowa Conference chairman, and Duane Arnold, right, Iowa Electric Light and Power Company president, welcome W. H. Dalton, the Canadian Gas Association's managing director and "good-will ambassador."

beyond company boundaries and present a united industry front, he suggested; the industry will not be torn down if we have alternate proposals for government advancements.

Hazarding a guess as to the future of Iowa's utility companies, N. Bernard Gussett, Iowa Power and Light Company chairman, predicted that the Iowa companies could meet tax-free competition by "one-company" planning that would make possible huge savings over and above the currently enjoyed economies resulting from economic-energy exchange via the Iowa Transmission Pool. To prove his point, he compared several hypothetical arrangements whereby larger and more efficient generating units at strategic major load centers and "pooling of pools" were shown to promise reduction in reserves from 33⅓ percent to 15 percent, and eventually 10 percent over the next 20 years. His various suggestions envisioned as many as 20 new generating units with individual company development, and as few as four new units with the "one-company" planning by all companies.

Supplementing the ideas of Mr. Gussett, J. K. Dillard, manager of electric-utility engineering, Westinghouse, described the current "Powercasting" study being made for the Iowa companies which will result in an automatic 20-year program for development on a one-system basis. This will evaluate size and site selection of new generating units, need for higher transmission voltage levels, etc., on the basis of load growth predictions, retirement policies, outage rates, spinning reserves, interconnections, service standards, etc., all tempered by random events, human decisions, statistical information, and historical probabilities.

Essentially, said Dillard, the computer study is an economic one to determine when, where, how big, what heat rate, etc., from some two billion questions. Computer input is about concluded, he said, and most of the answers should be resolved by March 1962; value of the study, of course, an optimized plan.

Closing his remarks, Dillard pointed out that the degree of success of any such study hinges upon the ability of system planners to supply a large number of alternate proposals which, combined with historical, statistical, and probability data, will result in maximum input for comparative purposes.

Iowa conference speakers George Neal, left, N. Bernard Gussett, center, and J. K. Dillard present information that will greatly influence 20-year development of Iowa companies.

What Financial People Want To Know

The only permanent record financial people have of utility performance, said T. W. Fowler, of Merrill Lynch, Pierce, Fenner and Smith, is the annual report which should therefore describe management's effectiveness with rate and regulatory problems, and financial interest in the company. Since two-thirds of all utility stocks are purchased by individuals, he added, recommendations of analysts are made based on an appraisal of management, rate of return, service area growth, regulatory atmosphere, and aggressiveness of company in selling. Investment companies have some 300 utilities to look at, he said, and it is in the best interests of the company to document industry growth and other successful achievements as well as describe desirability and resources of the service area.

Among featured speakers at Iowa Conference are, left, M. C. Turner, Iowa Southern Utilities, and Milton L. Kapp, Interstate Power Company president.

Summarizing comments of conference speakers, George Neal suggested that Iowa Utilities' approach their PR with modest programs rather than start a fight that would drive investors away. The pendulum will swing the other way, he predicted; the cooperatives are being aroused by a small group and the area earmarked for development cannot amount to much more than an "electrical desert."

At least two speakers on the program, he said, have referred to our companies as "consumer-owned." Perhaps these are the magic words we have been looking for to win broader public understanding.

Concluding his remarks, he said "I have no reservations at all about the future of Iowa's utility companies. They will be in good hands and their future management is right here in this room."

Hoosier Co-op Plant Unnecessary Reiterated At IEA Meeting

R. E. Doyle, Jr., president of the Indiana Electric Association and vice president, general manager of Indiana & Michigan Electric Co., opened the 52nd Annual IEA convention at French Lick, Ind. by pointing out that the general public needs to be told the investor-utility story. He mentioned that the results of numerous surveys of investor-owned utility customers have shown that far too many customers do not know the electric utility serving them is investor-owned. In addition, far too many people do not know the tax-and-interest advantages received by the REA Co-ops, Doyle asserted.

Leadership Taken For Granted

We have both guns and butter in the U. S. but many countries have to choose between these two items, Philip A. Fleger, president of the Edison Electric Institute and chairman of the board and president of quesne Light Co., pointed out. expounded the fact that the gen- l public in the U. S. takes our ctric leadership for granted and, nilarly our ability to out-produce ner countries has also been taken granted. Fleger said that the vestor-owned utilities should blicize the fact that the key to r production capability is the ailability of electric power in U. S.—mainly a tribute to the complishments of the investor- ned utilities.

Should Tell The World

Fleger challenged the investor- ned utilities to take a united nd to make the general public terested in the investor-owned lity accomplishments and, above , inform the public that these ilities are able to serve any elec- c load that might develop. Some ubt has been planted in the minds the general public whether the vestor-owned utilities are able to ke care of all power requirements, cording to Fleger. He emphasized at the investor-owned utilities ould tell the world that we are le and willing to serve all electri- l loads.

Central Indiana To Get Squeezed

A very interesting dissertation on litics was given by John A. Scott, ce president of the Truth Publish- g Company. He also described the o pressures due to "Interurbia" d "Meglopolis" which will squeeze ntral Indiana in the future— hio River Development and Lake ichigan Development. Scott told e group of utility personnel that ey will need to do much serious anning to provide electric service the large urban development pected in Indiana but he is con- ent that the investor-owned utili- s in Indiana can do the job very ll—without "outside" help.

Trends In Technical Education

Dr. A. R. Spalding, member of e mechanical engineering staff at rdue University, stimulated the inking of the utility group in the alm of education. He pointed out at, in our era of "explosion" in rms of technical progress, the ost important raw material we ve is students. Spalding explained me of the trends that are being encouraged for technical students of today, such as taking college math and science courses in high schools, self study and less class attendance. He mentioned that some beginning college courses are being completed by self study and taking tests. Spalding recommends more serious talk with young people who want to know the answers, less pawning off of technical jobs as being routine and encouragement toward professionalism as some of the ways to help today's technical students.

Inflation And Faith

"The system of inflation in the U. S. has one merit—no one can understand it," said Leonard E. Read, president of the Foundation for Economic Education. He mentioned that history has proven that governments inflate when they take over 20 percent of earned income to run the governments. In the U. S. 35 percent of our earned income is going to run government, according to Read, which is a result of government intervention in business.

Read recommended that the American people restore their faith in free men and fight the "isms," which promote the use of government to control the productive capability of the people. Read pointed out another motto of the "isms" which should put the self-reliant American on guard: "From each according to ability to each according to need by force of state."

Free Enterprise Needs Boost

A most emphatic speaker and consultant, Dr. Dwayne Orton, told the IEA that the intrinsic development of a person's spirit is the key to happy employees and this gives the employees self determination, resulting in more productive efficiency. He also mentioned that the only real limits of free enterprise are the capacities of the men. Orton believes that free enterprise would not be faced with governmental and union problems if men were more "enterprising." The Rotarian slogan "He profits most who serves best" is a good slogan for all business men to follow Orton related, and he also stressed that "Good business needs good public relations." He also commented that businesses fail because they do not realize innovation and cautioned the investor-owned utilities not to fall into that category.

F. J. McDiarmid, vice president in charge of securities for The Lincoln National Life Insurance Co., Ft. Wayne, Ind., commented that the Indiana Electric Utilities must be automatic as most of their employees were at the IEA meeting (675 registered, including wives) and he hadn't heard of any "lights out" reports.

McDiarmid explained many of the methods, problems, etc., in utility financing. He mentioned that the investor-owned utilities must raise most of their new capital requirements from the sale of new securities. Industrial companies, on the other hand, can frequently raise most of their capital requirements, sometimes all of them, from depreciation cash and retained earnings, according to McDiarmid. However, because these new capital requirements are so relatively large in the case of the utilities, at least in relation to their earnings, they have had to look to the public money markets for most of their new capital.

Some of the history of political and scientific progress was traced by McDiarmid as he commented the only halfway intelligent way he knew to project the future was by studying the trends of the past. This history-tracing pointed out the process of accelerating material progress in the U. S. He continued his informative discussion by stating, "Accelerating material progress increases risk of loss through obsolescence." McDiarmid explained that hardly any industry is free from this risk and certainly not the electric utilities; furthermore, "anyone who claims the utility industry is a riskless industry which should be content with a very low rate of return has just not read economic history." "You cannot set about to treat investment in public utilities poorly and expect to encourage other types of investment," McDiarmid stated. He commented that, in his opinion, duplicating present electrical facilities by building a large REA CO-OP would not attract any additional industry to Indiana.

Reasonable Public Utility Regulation

McDiarmid discussed five points

that are essential to the general economic well-being of public utilities: (1) Rate of return needs to be large enough to encourage capital investment, (2) Realization that investment in the public utility industry involves risk, (3) Original cost as a basis for rate making and adequacy of depreciation need inflation factors considered, (4) Earnings should be high enough on utility stock to encourage investment—good utility stock could be purchased at 8 or 9 times annual earnings in 1949, today the figure is around 22 and (5), Although consumers are very fine people and deserve every consideration, we can become too consumer-minded, to the exclusion of other important and vital considerations.

Women Customers' Viewpoint

The last, but far from least of the speakers—in fact, one of the outstanding speakers among an excellent group at the IEA conference, was Charlotte Montgomery who writes a regular column for Good Housekeeping Magazine. Because of her column "Speaker for the House" she receives many letters from housewives who do considerable complaining about electric appliances. Many appliances were considered poorly-designed or required too many trips by repairmen and that much of the blame for the troubles was at least indirectly put on the electric utilities. Of course, a direct reflection to the utilities lies in the fact that the appliance would not be using kwh when not in working order.

Mrs. Montgomery related that the utilities could well afford to give the women customers more than the "lip service" that many claim they receive. She advised the utility group to concentrate on satisfying the electrical requirements of the housewife—even to the point of setting up thorough appliance-service departments regardless of whether the utility sells appliances. Mrs. Montgomery mentioned that many letters she receives are from housewives who are not able to get appliances repaired due to the dealer from which the appliance was purchased going out of business or the customer moving after purchase of an appliance. She also suggested setting up appliance repair departments with round-the-clock service in order to help the working-housewife get her appliances repaired. Mrs. Montgomery predicted that there will be 30 million women working in jobs outside the home by 1970.

Fitzwater New IEA Pres.

Ottis T. Fitzwater, president of Indianapolis Power & Light Co was elected as the new president o IEA; Marvin J. Evans, assistant t the president and director of publi relations of the Southern India Gas & Electric, was elected vic president; and A. C. Crandall o Indianapolis was re-elected secretary-treasurer.

Advances In Field of Generation Highlight National Power Conference

Presentations by speakers on the agenda for the National Power Conference in San Francisco encompassed such important subjects as nuclear-plant design, automation of steam-electric stations, plant performance testing, and operating economics.

A group of three authors with Atomics International—R. W. Dickinson, R. C. Gerber, and C. L. Larson—described the Hallam Nuclear Power Facility, owned by AEC and to be operated by the Consumers Public Power District. This sodium-cooled, graphite-moderated nuclear-power facility is designed to produce superheated steam to generate 7.5 Mwe net power.

Site construction started in April 1959 and was completed in July 1961. After a year of test operation, the Hallam Facility is expected to be running at full power.

Approximate cost was reported as $450 per net Kwe for the nuclear facility. (The turbine-generator is included in the CPPD conventional plant.) Fuel costs are estimated at 4.7 Mils/kwh with the initial core of U-MO fuel. This includes a 4% inventory charge on fissionable material, and is based on a plant factor of 80%.

A larger plant design, capable of 360 Mwe gross output, was also discussed by these authors. Its estimated total cost was given as $196 per Kwe (gross) of capacity, at 1961 prices, including customer direct and indirect costs. Economic studies, based on 80% plant factor and 14% fixed charges, result in a total energy cost of 6.5 Mils/N Kwh, including operating, maintenance and insurance costs.

Present and future possibilities of the high-temperature gas-cooled reactor were analyzed by T. G. LeClair of the General Atomic Div. o General Dynamics Corp. Relative t the Peach Bottom 40-Mw prototyp HTGR plant, he noted that it i being designed to produce steam a 1450 psi and 1000 F. Basic desig parameters for this project hav been established. Also, a very larg portion of the total research and development work necessary befor beginning construction has bee completed. Assuming a permit is issued on schedule, constructio should be completed in the Sprin of 1964, Mr. LeClair reported.

Work is now proceeding unde the ESADA (Empire-State Atomi Development Associates) progra on a development and design stud directed toward a full-scale plant i the range of 300 to 500 Mw electrica capacity. Mr. LeClair said the expected goal of this program is plant which can produce electri power at a cost competitive wit fossil fuels.

John Barnard, of the Genera Electric Co., stated that G. E., wit the assistance and encouragement o ESADA, has embarked on the design and construction of an experimental superheat reactor. It is bein designed as a flexible fuel test be with the capability of simultaneously testing a large number o experimental fuel elements in a operating reactor environment.

Power Plant Automation

Speaking on the "Philosophy o Automation," R. D. Hottenstine an R. Egglestone, Research & Produc Development, Combustion Eng neering, Inc., said, "The power industry is looking for two princip returns from the field of automation: (1) gains in over-all operatin

(Continued on page 98)

Operating and Maintenance Superintendent O.L. Hughes (left) of Mississippi Power and Light and J.W. Stone of General Electric compare 1958 Preferred Design Transformer (rear) with 1961 low-height unit.

CUSTOMER FEEDBACK:

keeping the "Preferred" in referred Design Transformers

Feedback from sales engineers' calls similar to the one above and from 32 special utility meetings held last year has helped General Electric provide power transformers with the latest customer-preferred features:

- Large substation units rated up to 25,000 kva are now 40 inches lower than previous designs, to solve bridge clearance problems.
- Permalex® transformer insulation, which permits operation of units at 65C rise with 12% more continuous capacity and normal life expectancy, is now standard on low-height units.
- Extended ratings for generator step-up transformers increase the upper limit of the Preferred Design line from 250,000 to 400,000 kva.

These and other changes—redesigned cooling equipment and a sealed-tank oil-preservation method on the new low-height units, for example—are the results of a continuing responsiveness to utility needs. Such responsiveness has been the basis of Preferred Design since the concept (first announced in 1957) grew out of a nationwide survey.

To learn how you can benefit from this combination of customer-preferred features and product uniformity, call your G-E Sales Engineer or write to Section 604-17, General Electric Company, Schenectady 5, N. Y., and ask for bulletin GEA-6604B.

Progress Is Our Most Important Product

GENERAL ELECTRIC

MANAGEMENT-MARKETING

Pre-Emption, Duplicate Service

Disputes Threaten Relations Between Co-ops, Companies

Is the attitude of the Administration in Washington – especially as personified by REA Administrator Norman M. Clapp—destined to develop a spreading and possibly permanent discord in otherwise generally harmonious relations between the rural electric co-ops and the investor-owned utility companies? In what measure can Administrator Clapp substantiate his recent charges that private power companies are "determined to keep the co-operatives in a state of dependency for power supply to hasten the day when they can ultimately be absorbed or destroyed"?

Many shades of answers might be supplied to such controversial questions, depending upon where you sit, of course. Yet, answers (or partial answers) are being given in many parts of the electric power industry, and before the year is out, certain of the threats to good inter-industry relations may well become more real than fancied.

It seems evident, too, that the Federal government agency may be restrained in its influence on such relationships by the key role being played by the state regulatory commissions. The decisions of commissions in states such as Maryland, Alabama and Indiana where co-ops have sought approval from the regulatory bodies to build their own generating and transmissions facilities may reveal quite a bit more about where Federal and state sovereignty applies.

State courts, too, are having a say about where sovereignty rests. Last month in Florida, for example, the ruling of a circuit court judge in the case involving service to customers of Tampa Elect. Co. and The Withlacoochee River Elect. Cooperative in areas where lines of the two firms are adjacent, was based on an interpretation of state statutes. The ruling embraces the court's philosophy that private industry is to be given pre-emption in such instances. In the Florida decision, Judge Phillips not only ruled that in this case central station service was available from Tampa Elect., but that, in the future, "it may well be these rural electric cooperatives will be converted to regular private industries on an equal basis with other private industry" and that, indeed, "these facilities may at some time in the future be acquired by private industry."

The Florida Circuit Court judge expressed the opinion (earlier, in hearings on the case) that "initial sovereignty" in the case rests in Florida, acknowledging "that different conclusions" might result from the trial of this case in Federal courts. He explained:

"I feel that the initial sovereignty rests in the State of Florida and that the Federal government has only delegated sovereignty; that while the Federal government may exercise control over portions of the rural electrification organization, such as financing and criteria for financing, that still we have statutes in the State of Florida that govern us, which statutes have not yet been found to be unconstitutional. Accordingly, we are bound by these statutes."

In reply to the Cooperative counsel's question: "What if the Co-op is adjacent to a property and the Tampa Electric Company, after the Co-op has already been there, moves into the property so that their line is available and adjacent, what is the situation there?"

Judge Phillips replied "It depends upon whether or not the Tampa Electric Company line, before the extension to reach that customer, was available within a reasonable interpretation of the word 'available.' If it were a hundred feet from being adjacent, I think Tampa Electric should have the customer. If it were a mile away from the property on the east and the Co-op was adjacent on the west, I think the Co-op should serve."

As significant as controversy over customer service may be, disputes over pending generating facility construction are raising new inter-industry relations problems of possibly even greater significance. N one doubts the intensity of the figh certain power companies are wagin against such projects. But, even i the problem areas, utility executive profess to continue to look for way to get along with the co-ops. In thi regard, the president of Norther Indiana P.S. Co., Dean H. Mitchell recently wrote to all NIPSCO employes:

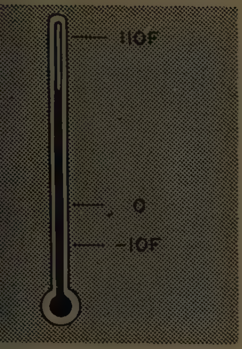
"We have always had good relations with the 12 northern Indian REMC's which we serve annuall with 170,000,000 kilowatt hours o wholesale central station electri power, and we are looking forwar to a continuation of these relation We have a responsibility to the and to all of our customers to alway have plenty of power available fo their needs. We have never failed t meet this responsibility and wil continue to do all that is necessar to assure them adequate, depend able service at reasonable rates. Th price charged today by NIPSCO t these REMC's, under present rate is 21-percent under the 1937 rate—i the face of inflationary costs tha are common knowledge."

In the face of increasingly aggres sive (and more strongly financed efforts of the co-ops to grow an prosper, however, not many repre sentatives of privately-owned utilit management are likely to try fo long to get on together at any cos Few will see the need for workin together as having the urgency at tached to such cooperation as Loui H. Roddis, Jr. does, for example.

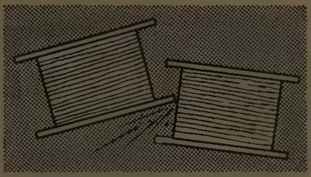
In his recent address for the Na tional Electric Farm Power Confer ence, the president of the Pennsyl vania Electric Co. declared tha though many executives of investo owned utilities remind him "yo cannot rely on the R.E.C.'s and it better to fight them rather than hel them . . . I still believe that coop erative systems and investor-owne companies not only can, but mus work together to beat back the com petition of other forms of energy."

CABLE TALK

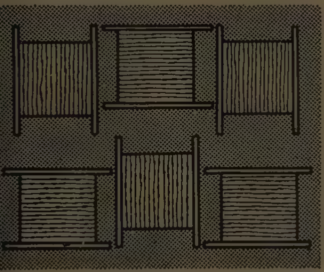
6 tips to help you make the most of your investment in wire and cable

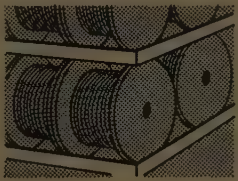


1. Avoid extreme temperatures —below 10F and above 110F (unless cable is specifically designed for this purpose). Low temperatures are seldom harmful to cable, but when they are combined with impact, flexing or other mechanical action, it's possible that the cable may be damaged by cracking, flaking or complete rupture of the coverings. Excessively high temperature, all by itself, can materially shorten the otential service life of stored cable. Thermoplastic com- onents may soften and flow; rubber and many other aterials undergo chemical and physical changes at high emperatures. You can avoid this problem by not storing able near heating units, steam pipes, etc.

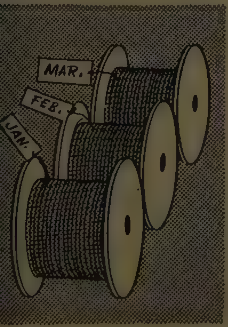


. Avoid mechanical im- act and crushing. Wire on a eel can be rendered useless y allowing the flange of an- ther reel to crash against it. rranging the stored reels in a crosshatch pattern is he simplest way to avoid this kind of accident. If space is at a premium, the reels may be stored in trays that allow only the flanges of adjacent reels to contact.



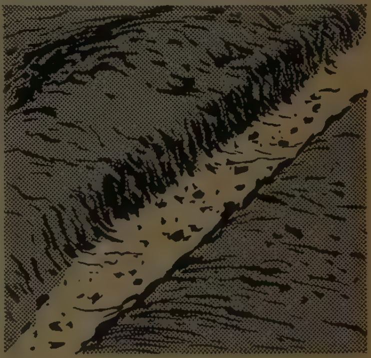


. Use the oldest stocks first. Very few materials nprove with age, so the sooner you use stored cable the nger it will last in service. Also, the less time a cable spends in storage, the less chance there is for damage. Keep rotating stocks so that the newest cable goes to the end of the line.



4. Swab conduit before pulling wire
A remarkable amount of abrasive material—nails, glass and such—can accumulate in conduit, pipe or duct before the wire is pulled through. And pulling a wire or cable through such litter could damage it severely. If you pull a swab through the conduit ahead of the wire to clear the way, you'll eliminate a big source of hidden installation damage.

5. "Direct burial" doesn't mean "on top of anything"
The specification "direct burial" on a cable doesn't mean that you can afford to bury the cable directly on top of whatever you might find in the earth. Trenches should be cleared of rocks and broken glass before the cable is buried. Freezing and thawing can make rocks shift position, and, possibly, exert enough pressure on the cable to cause premature failure. The same danger exists when wires that cross underground rest on each other. Moral: clear trenches before burying cable, bed the cable in sand, and keep crossed cables separated.



6. Pick the strongest component when pulling cable
When wire or cable is being pulled-in, either through conduit or aerially on poles, it's essential to put all the pulling tension on the strongest part of the cable assembly. Ordinary single-conductor material should have pulling tension applied to the bare conductor. Applying tension to the covering materials tends to stretch them, and can lead to breaks in some cases. Always pull preassembled aerial cables by the messenger, not by the insulated conductors. Interlocked-armor cable should never be pulled by the armor, since this may cause severe damage by unlocking the armor.

* * *

This collection of ideas comes from many years of probing into wire and cable problems—and solving them. It's likely that we've come across some problems just like yours, and together we could probably work out a fine solution. So, please give us a call, or write Anaconda Wire and Cable Company, 25 Broadway, New York 4, New York. Department EFL-1—EL&P 61304U

ASK THE MAN FROM

ANACONDA®

FOR TECHNICAL ASSISTANCE ON WIRE AND CABLE PROBLEMS

ECONOMIC OUTLOOK

BY A. C. FARMER
ECONOMIC CONSULTANT

The Report of the Commission on Money and Credit—Part II

Under the subject "Monetary Policy" the following statement is made in regard to "general monetary control."

"The concept underlying general monetary control is relatively straight-forward. Monetary restraint reduces the availability of credit and increases its cost, and these retard the flow of expenditures, employment, income, and output. Monetary ease in general has the opposite effects on credit and thus encourages an expansion in these flows.

"The Federal Reserve System exercises general monetary control through the use of three major instruments: (1) the power to set the level of required reserves that member banks must hold, (2) engagement in open market operations which alter the volume of actual reserve balances available to banks, and (3) changes in the terms under which banks may replenish a deficiency in required reserves by borrowing from Federal Reserve Banks. All three instruments of policy and open market operations in particular, directly affect the net reserve positions of member banks. They also have direct impacts on other economic variables."

The writer would agree with the above statement —but it is incomplete—and because it is incomplete, the Commission is led to make innumerable recommendations to deal with recognized difficulties in the economy instead of adopting a direct attack on the seat of the difficulties.

The two factors overlooked by the Commission are:

(1) Indirect financing, sometimes called back-door spending, by Congress in connection with authorities or commissions empowered to support the borrowing of money by a government guarantee that the Treasury will make good on the note in the event of a default. These include Housing Authorities, urban renewal, and farm programs.

(2) Deficit spending in the event the Federal expenditures exceed the estimated Federal income.

Action taken by the Federal Reserve Bank has the effect of determining the cyclical swings of the business economy. For example, a low Federal Reserve discount rate is stimulating to business activity and a high Federal Reserve discount rate is discouraging to business activity.

On the other hand, indirect financing is responsible for an excessive increase in the volume of credit.

For example, Government underwritten mortgage debt has grown from $4.3-billion in 1945 to $56.4-billion in 1960. Total mortgage debt on one to four family properties has increased from $18.6-billion in 1945 to $141.8-billion in 1960. Total mortgage debt outstanding has increased from $35.5-billion in 1945 to $206.5-billion in 1960.

Bank loans at all commercial banks have increased from $26.1-billion in 1945 to $114.2-billion in 1960.

Total net private debt has increased from $140-billion in 1945 to $581.9-billion in 1960.

The reckless expansion of the use of credit has resulted in an expansion of private debt of all kinds at a rate of ten percent per year cumulative in comparison with a growth rate for the economy of less than five percent.

This means that the economy is moving once more towards a breakdown similar to what occurred after 1929.

The approach to a danger zone accurately can be measured by two important financial indices.

(1) the ratio of the total net private debt to the total volume of money in the economy, and

(2) the ratio of the bank loans at all commercial banks to the net demand deposits.

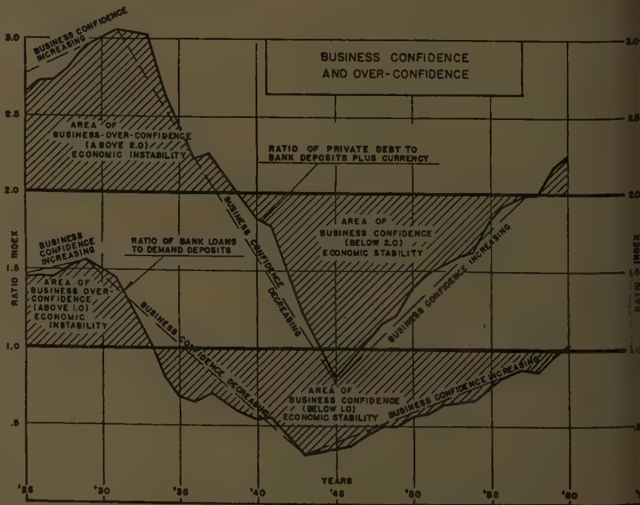
The changes in these indices are shown on the chart.

In 1929, net private debt reached dangerous proportions in relation to the total volume of money in the economy.

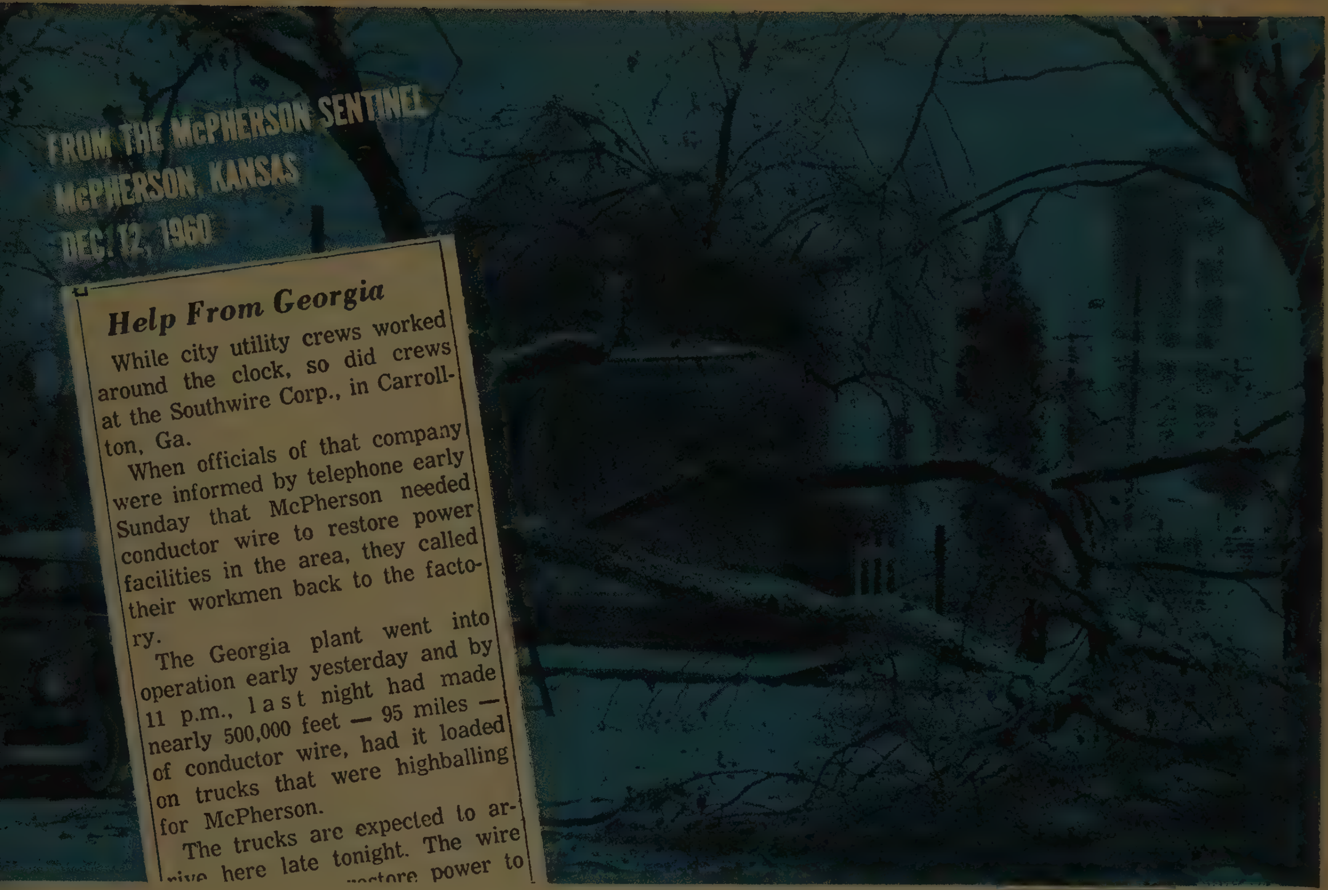
Similarly, the bank loans reached a dangerous level compared with the net demand deposits.

A breakdown of the economy brought about the most severe business depression ever experienced in America.

Here we have complete support for the contention of the vice-chairman, Mr. H. Christian Sonne, that there should be given consideration of "the monetary problem that seems likely to be important in the future." The Commission has not done this.



Editor's note: First part of Mr. Farmer's discussion of the report of the Commission on Money and Credit appeared in EL&P, Oct. 1, page 44.



Help From Georgia

While city utility crews worked around the clock, so did crews at the Southwire Corp., in Carrollton, Ga.

When officials of that company were informed by telephone early Sunday that McPherson needed conductor wire to restore power facilities in the area, they called their workmen back to the factory.

The Georgia plant went into operation early yesterday and by 11 p.m., last night had made nearly 500,000 feet — 95 miles — of conductor wire, had it loaded on trucks that were highballing for McPherson.

The trucks are expected to arrive here late tonight. The wire

restore power to

Photo courtesy The McPherson Sentinel

Some Wire Needs Can't Be Forecast,

But Southwire Service Can!

Every man and every company has a different idea of the word "service."

With some, service means hours. With others it's a matter of days. Others, hamstrung by outmoded thinking and systems that are covered with cobwebs, think in terms of weeks.

At Southwire, service is paramount in every man's mind. We are proud of our reputation for quality, but we know that our business has been built on *service.*

Our concept of service is based on two facts: (1) Extremely flexible manufacturing schedules; (2) Rapid delivery by our own fleet of trucks.

We hope you will make us back up these claims. When you need wire in a hurry, call Southwire, and get acquainted with the fastest service in the industry. Remember: *Southwire means service!*

- Bare and Weatherproof Copper and Aluminum Line Wire
- Neoprene, Polyethylene, and VWP* (Vinyl) Weatherproof Copper, Aluminum and Triplex
- U.R.C. (DBWP, TBWP) Copper
- Copperweld® Conductors
- Copper and Aluminum Building Wire
- ACSR and All Aluminum Cable
- Galvanized Steel Guy Strand and Static Wire
- Aluminized Steel Guy Strand and Static Wire
- Aluminum Alloy Wire
- Cable Accessories
- NM Sheathed Cable
- THW Building Wire
- ALSO FABRICATORS OF COPPER AND ALUMINUM FOR WIRE AND CABLE MANUFACTURERS

Southwire® Company

Carrollton, Georgia — TErrace 2-6311

SOUTHWIRE serves the world

REGULATORY REVIEW

PUC of California Rules on Rate Treatment of Taxes Deferred Under Liberalized Methods of Depreciation

1. Southern California Edison will transfer amounts from surplus to tax reserve to make up for so called "unjust" enrichment in 1960.
2. Pacific Gas & Electric transfers $35,000,000 from tax reserve to depreciation reserve.
3. PUC staff given authority to investigate all other companies who have taken liberalized depreciation.

In prior Orders of the California PUC (specifically in No. 61,711) it was directed that tax reserves arising from the deferral of taxes under Section 167 be transferred to the depreciation reserve. The PUC seemingly backed off from this position when it said in part:

"At the rehearing, certain parties argued that depreciation is an inherently improper account in which to record the tax savings (or tax deferrals) resulting from liberalized depreciation. On the other hand, there was evidence that at least one State (Wisconsin) requires such use of the depreciation accounts and that many leading accounting experts approve of it. So also note that the Securities and Exchange Commission, after extensive consideration, has found the practice acceptable. . . . It is unnecessary to consider these conflicting views in detail, for we have concluded that *use of the depreciation reserve for recording these accumulations should be made permissive rather than compulsory.** Ordering Paragraph 1 of Decision No. 61,711 will be modified accordingly."

Admittedly, while the transfer of the tax reserve to the depreciation reserve is permissible, that still does not make it right from either the accounting or economic point of view. If the depreciation reserve is supposed to measure the amount of service life consumed by the Company rendering service to the public, then the transfer of amounts arising from liberalized depreciation or any other tax gimmick is patently an unjustified move designed for the sole purpose of reducing the rate base. If that is the ultimate objective of the Commission, it might as well transfer the injuries and damages reserve to the depreciation reserve and deduct that from the rate base.

The PUC went on to say (in its polite regulatory manner) that such transfers would result ". . . in substantial prejudice or inconvenience." What it actually meant was that property would in effect be confiscated.

The regulatory risks which a California utility has had to face are well exemplified by the PUC statement and the implied threat found in its footnotes when it said in part:

"For example, San Diego Gas & Electric Company pointed out that it no longer takes liberalized depreciation for tax purposes[1] and therefore does now pay higher taxes as a consequence of the reduction in taxes which it obtained while it was using liberalized depreciation; these current tax increases are met by charges to the tax reserve.[2] The company argues that to transfer the tax reserve to the depreciation reserve under these circumstances would require the utility to meet such tax increases out of its profit. Several other utilities which no longer use liberalized depreciation might be similarly affected.[3]"

The PUC's approach to the question of tax expense is based on its well known approach "Heads I win, Tails you lose." For example, while it orders utilities to use actual taxes when they employ liberalized depreciation, by the same token companies who have reverted to straight line depreciation will now be required to charge their tax reserve and credit the actual taxes that they pay in order to reduce their cost of service and hence their revenue requirements.

The recital of the foregoing problems should be considered by the private electric utility industry as an indication of the threat that it faces possibly in all jurisdictions.

The PUC made it clear that all utilities will be given the full treatment by the statement that: "The various proposals for disposition of these reserves (submitted in response to the Commission's inquiries) will be handled on an individual basis. It bears emphasis that in rate proceedings we will continue: (1) to deduct from rate base the tax reserves resulting from liberalized depreciation and accelerated amortization, and (2) to reduce test year tax expense by the amount of any charge to such reserves."

It is presumed that "growth" (the magic word in the utility business) will take care of the additional tax burden that will face the California utilities in the near future. It is on that ground that the PUC will obviously attempt to escape its responsibilities.

Continuing Tax Differentials

It is of interest to note the Commission's thinking with respect to certain earlier practices of companies under its jurisdiction, and

(*Continued on page 97*)

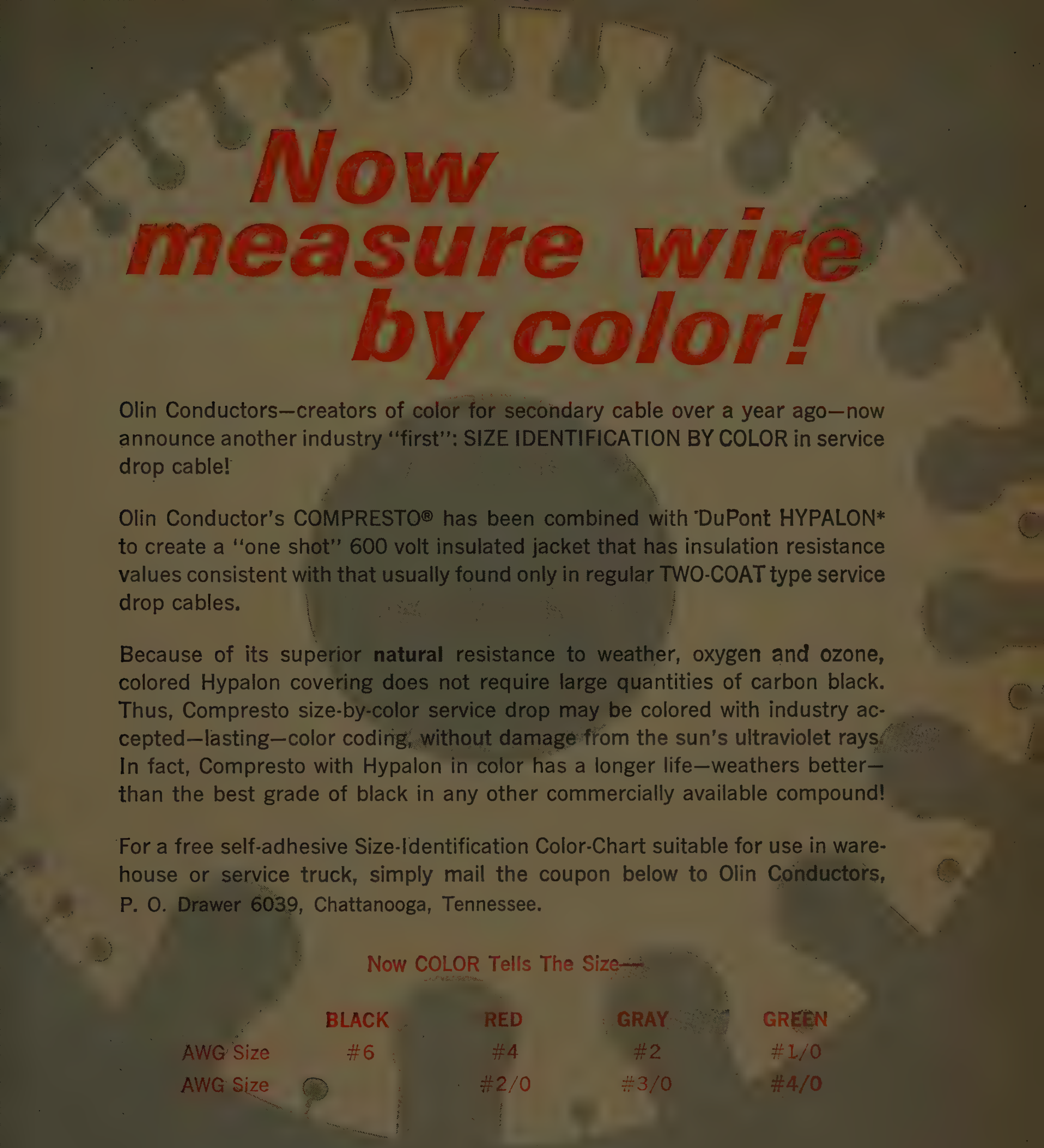
---

* Italics supplied

[1] As stated in the order granting rehearing of Decision No. 61,711, we are not here considering the claimed duty of a utility to take advantage of liberalized depreciation.

[2] On August 22, 1961, subsequent to the submission of this matter, we issued Decision No. 62,446 in Application No. 42,887, in which we expressly recognized such use of San Diego Gas & Electric Company's tax reserve, and for test year purposes, we correspondingly reduced its tax expense.

[3] Of course, under the straight-line remaining life method, an addition to depreciation reserve would lead to a decrease in depreciation expense, thus tending to compensate for the tax increases; but the two results would not necessarily be exactly offsetting. Certain utilities also argue that another effect of the proposed transfer to depreciation reserve would be a reduction in the total depreciation recoverable on the assets affected.



Now measure wire by color!

Olin Conductors—creators of color for secondary cable over a year ago—now announce another industry "first": SIZE IDENTIFICATION BY COLOR in service drop cable!

Olin Conductor's COMPRESTO® has been combined with DuPont HYPALON* to create a "one shot" 600 volt insulated jacket that has insulation resistance values consistent with that usually found only in regular TWO-COAT type service drop cables.

Because of its superior **natural** resistance to weather, oxygen and ozone, colored Hypalon covering does not require large quantities of carbon black. Thus, Compresto size-by-color service drop may be colored with industry accepted—lasting—color coding, without damage from the sun's ultraviolet rays. In fact, Compresto with Hypalon in color has a longer life—weathers better—than the best grade of black in any other commercially available compound!

For a free self-adhesive Size-Identification Color-Chart suitable for use in warehouse or service truck, simply mail the coupon below to Olin Conductors, P. O. Drawer 6039, Chattanooga, Tennessee.

Now COLOR Tells The Size—

	BLACK	RED	GRAY	GREEN
AWG Size	#6	#4	#2	#1/0
AWG Size		#2/0	#3/0	#4/0

Olin CONDUCTORS

LS DIVISION, OLIN

DRAWER 6039 • CHATTANOOGA, TENN.

Please send free of charge ______ Olin Size-Identification Color-Charts. (indicate number)

NAME ______

COMPANY ______

STREET ______

CITY ______ STATE ______

WASHINGTON OUTLOOK

BY RALPH ELLIOTT
WASHINGTON EDITOR

Upper Colorado Transmission Controversy Still Unsettled

The most hotly contested government power issue of the past session of Congress—whether the government or a group of investor-owned utilities should build the transmission facilities for marketing power from the Upper Colorado Storage Project—was left in a strangely unsettled status by last minute action in the rush to adjourn. Just how well either side fared in this supercharged public vs. private power controversy is open to speculation. Only time will tell. It appears, however, that the government power advocates have gained an edge in the first round of the contest.

The somewhat hazy and peculiarly negative language of the 11th-hour Colorado Project compromise arrived at by Senate and House conferees, is open to a face value interpretation (one quickly embraced by public ownership proponents) as giving Interior Department the green light to proceed, in its discretion, with the proposed all-federal system. But in view of earlier instructions from the Senate side, the question remains: whether Interior Secretary Udall is morally bound to seek wheeling negotiations with the area power companies, looking to major savings in federal investment; and what Congress might do about it if good faith negotiations are not undertaken.

Although the House approved, with no strings attached, Interior's request for $13.7-million to begin construction of the disputed marketing lines as well as the undisputed project interconnecting lines (which together comprise Interior's proposed backbone, or "yardstick" system), the Senate took a dim view of barging ahead with this $176-million federal grid, in light of the pending offer by five area utilities to build the marketing lines and wheel the power at an immense saving to the government and the taxpayers. After fully hearing both sides, the Senate Appropriations Committee OK'd the lines to integrate the projects, but told Interior to "exhaust every possible effort to obtain proper wheeling agreements" to accomplish the purpose of the marketing lines, and to report back by next February 15. The full Senate made no effort to change these instructions.

By this time adjournment fever was running high, and the conferees, in a final drive to clear the big Public Works Appropriation Bill for passage, agreed to let construction begin on the marketing lines "unless the Secretary of the Interior finds it practicable and in the national interest to enter into wheeling agreements with private power interests."

The statement by Secretary Udall which promptly followed left little doubt that he considered that Congress had delegated him the authority to resolve the controversy in his own way. Said Udall: "This Department will implement the decision of Congress and proceed forthwith to construct the basic backbone transmission lines needed to market Colorado River Storage Project power. At the same time, we will carry out the recommendation of Congress and conduct negotiations with all power suppliers in the area with respect to interconnections and wheeling agreements—beyond the basic backbone system—which are in the national interest and provide mutual advantage to all parties concerned."

Interior has already made it abundantly clear that it views the utilities' wheeling proposal, insofar as it would substantially replace the all-federal backbone system, as neither practicable nor in the national interest. Its further negotiations with the companies, therefore, are not likely to cover other than a few lines beyond the major delivery points of the proposed federal system. As Mr. Udall told a press conference recently, he has flatly ruled out any kind of "package" wheeling arrangement such as the companies offered. The backbone lines must be built by the government, he said, to assure the "integrity" of the system.

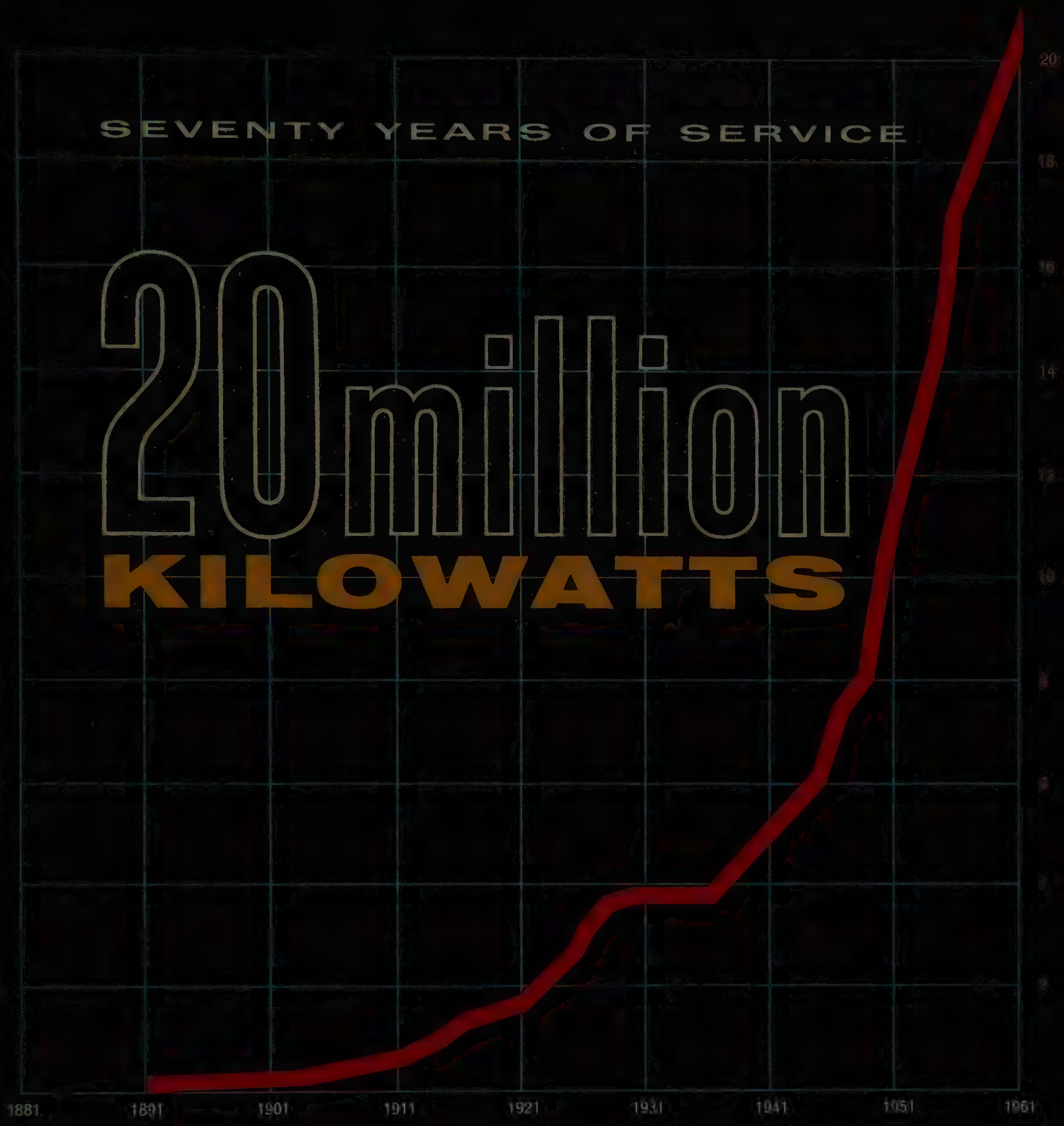
On the other hand, several members of Congress, from both sides of the aisle, have indicated a stron feeling that the conferees' language although weakly worded, still requires Interior to negotiate on the basis of something more than just a line here and there beyond the are of the proposed backbone system.

Importance of the outcome of this controversy is immeasurable, for the overriding issue involved in the all-federal transmission system proposa reaches far beyond the borders o the five-state area immediately concerned. The New Frontier powe planners, whose policies and action appear aimed in the direction o socialized electric service, visualiz that system as a major leg of a eventual nation-wide, federalize giant power grid. They are much to fascinated with this vision to allow without a last-ditch fight, the effectiveness of the Colorado system t be diluted by the intrusion of investor-financed facilities on any majo scale.

Under Interior's interpretation o the conferees' language, the transmission line controversy exists n longer; the Department now wil merely negotiate only on thos wheeling proposals which it decide are "practicable and in the nationa interest."

But the controversy is far fro being resolved, and Interior's appraisal of its newly-won discretionary authority seems to be somewha inflated. This will likely becom more apparent when Congress take up the Department's fiscal 196 budget request next year.

Big Shoes to Fill!



SEVENTY YEARS OF SERVICE

20 million KILOWATTS

For 70 years Sargent & Lundy has been devoted to the engineering of steam electric generating stations and power systems.

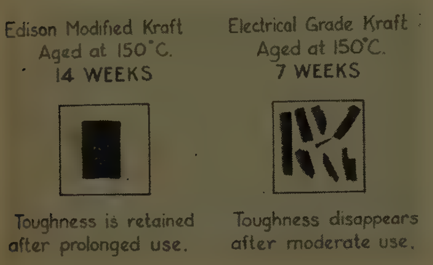
With a background of 20,000,000 kilowatts in projects authorized and engineered, Sargent & Lundy serves its clients in the areas of system planning, site selection, studies and evaluations, and conventional and nuclear plant design.

SARGENT & LUNDY
ENGINEERS

140 S. DEARBORN STREET, CHICAGO 3, ILLINOIS

New Transformer Insulation

A new distribution transformer insulation system has been announced by **Line Material Industries, McGraw-Edison Co.** Designated "Duralem," the new insulation will be incorporated in all 10-, 15-, and 25-kva production units this quarter, with other sizes following shortly.



"Duralem" insulation possesses all the properties necessary to provide a heat-resistant electrical barrier and mechanical support. Accelerated life tests, according to Line Material, showed the new paper has a good balance between the various characteristics that affect its life. These include toughness, fold endurance, and tensile, burst, tear, and dielectric strength. This insulation can perform effectively in transformers designed for operation at 80 deg C hottest-spot rise.

Circle item #1 on reply card

Overcurrent Ground Relays

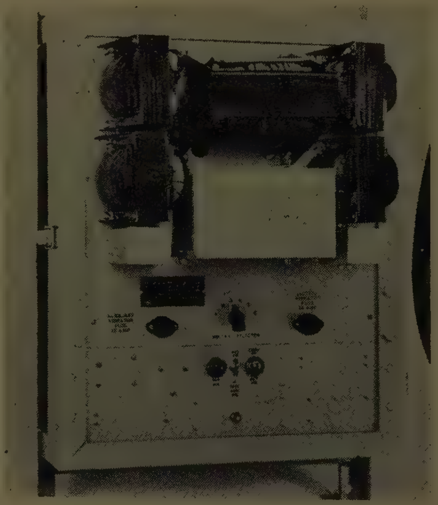
Three new negative-sequence overcurrent ground relays (types CRQ, IRQ, and KRQ) are offered by the **Westinghouse Electric Corp.**

On solidly grounded systems the negative-sequence directional unit is sensitive enough for the new relays to be used without checking the magnitude of negative-sequence quantities under ground fault conditions. The overcurrent units can be set in the same manner as the standard zero sequence ground relays. In addition, the new relays may be easily checked in the field for correct installation with load current, which is not feasible on current or dual-polarized zero sequence relays.

Circle item #2 on reply card

Emergency Power Source

Instantaneous Emergency Power Sources to maintain the operation of critical equipment during commercial power failures are now being produced by **Cornell-Dubilier Electronics**, a division of **Federal Pacific Electric Co.**



Designed to supply emergency power to such systems as microwave relays, early warning stations, lighting facilities, and electronic control devices of all kinds, the new emergency power source provides a number of basic advantages.

Circle item #3 on reply card

Versatile Skyworker

New Skyworker Model 1044a, by **Hughes-Keenan Division, U. S. Air Conditioning Corp.**, providing a working height of 50 feet, is designed for line distribution work. Rotation of the mounting turret—40 deg past full circle—insures wide lateral movement, while the lower boom, moving through a vertical arc of 135 deg, provides still greater versatility.

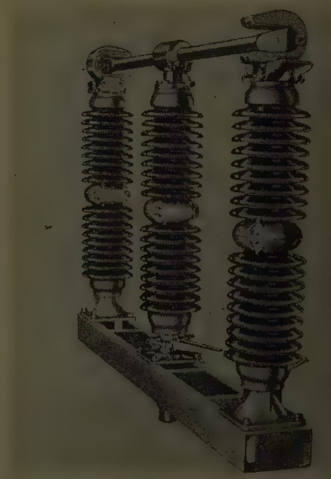
According to the manufacturer, Model 1044a was designed to combine in a single low-cost unit the ability to handle all routine line work plus the roughest demands of work at junction poles, outrigged crossarms, mid-span and other difficult-to-reach areas.

Circle item #4 on reply card

Disconnect Switch

The BR-60, by the **James R. Kearney Corp.**, is a group operated, double horizontal break air switch with three insulator stacks per pole. The blade pivots at its mid-section over the center stack and its motion is parallel to the switch base. The blade movement is controlled by rotation of the center insulator stack. The blade is made in one piece, of high-grade, high conductivity, hard-drawn copper tubing flattened at both ends.

The contacts are of the reduced

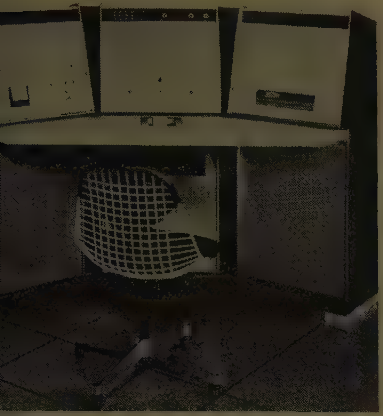


high pressure, self-wiping Contact pressure is obtained tainless steel compression gs insulated from the current.

ircle item #5 on reply card

rations Recorder

nellit division, Information ems, Inc., is now offering a new



sistorized high speed sequential t recording annunciator which zes all solid state components pt in the printer. The Panastat VII is designed for monitor- variables in all continuous proc- industries including power ts.

l alarm points going off-normal eturning to normal are printed me sequence even if only one second apart. Alarms can never ost or scrambled even if the nory storage is filled. Yards of ess blank tape accumulation eliminated because the paper advances only after each ting.

Circle item #6 on reply card

able Power

give electric-utility customers er service, even during emer- ies, the **Hindle Transformer** is offering special portable

ELECTRICAL POWER BY DC POWER SPECIALISTS

Mathematical Design from Scripta Mathematica

RECTIFIER QUALITY

Quality is a big word at RAPID ELECTRIC

From engineering design and development to final production and shipment RAPID maintains strict control over its high quality.

(1) NEMA standards strictly maintained.

(2) Transformers, reactors, magnetic amplifiers, meter shunts, and selenium stacks designed and produced by RAPID, insures quality control.

(3) Years of skillful engineering, production methods and test facilities assure rigid high quality standards will be upheld.

Regardless of application, RAPID is interested in your dc power requirements. Why not send your inquiry in today? Write or call TA 8-2200.

Catalog and descriptive brochures available upon request.

RAPID ELECTRIC CO., INC.

2881 MIDDLETOWN ROAD • NEW YORK 61, N.Y. • TAlmadge 8-2200
PLANTS: (4) NEW YORK, N.Y. • GRAYSBRIDGE ROAD, BROOKFIELD, CONN.

NEW
SUPER
SAFE ROPE
FIELD TEST PROVEN TO HAVE
LOWEST ELECTRICAL CONDUCTIVITY!
Berkley
GLADIATOR
MADE STRONGER TO LAST LONGER
FREE SAMPLE

POLYPROPYLENE ROPE

AND POLYETHYLENE ROPE

Berkley Gladiator Polypropylene rope and Polyethylene rope —from 3/16 to 2" in diameter — is the ideal rope for hand lines, pulling transmission cables, for block tackle, etc. This new rope sheds water and is completely rot-resistant — thus giving it a very low ELECTRICAL CONDUCTIVITY. Extra easy to handle because it is light in weight, yet 50% stronger than manila. It can be easily spliced and carries a stronger knot strength than manila. Berkley's new safe-to-handle Gladiator rope will do a better job for you.

Please rush me sample, costs and fact sheets on Polypropylene.
NAME__________ COMPANY__________
ADDRESS__________
CITY__________ STATE__________
☐ Check here if you want a Berkley representative to call on you.
How much footage of rope do you purchase a year?

BERKLEY & COMPANY • SPIRIT LAKE, IOWA

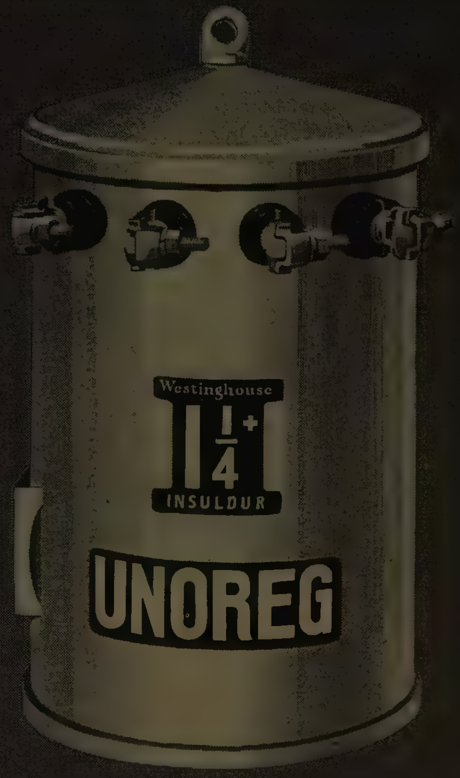
Now 2 sizes of
UNOREG

Save 50% and more on voltage re-regulation

Now Westinghouse UNOREG* can handle 81% of all voltage re-regulation on secondary distribution systems—at savings up to 60%. The introduction of a new 2½ KVA UNOREG extends the benefits of this lowest cost regulating system to cover a total of 8 standard ratings in over 600 transformer styles.

This unique Westinghouse voltage regulator brings immediate relief to secondary distribution problems, offers a new concept in systems design and voltage regulation and provides sound re-regulation under emergency conditions.

UNOREG works on an induction principle with two sets of coils: a rotor and a stator. A solid state control meters the input voltage, actuates the rotor which raises or lowers the output voltage automatically. Its operation is maintenance-free and completely reliable. Contact your Westinghouse sales engineer to learn how other electric utilities are reducing operating costs with UNOREG. Or, write: Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. *You can be sure . . . if it's Westinghouse.*



The 1¼ KVA UNOREG is available to handle transformer ratings up to 25 KVA and the 2½ KVA model handles ratings up to 50 KVA. Color-coded for easy connection. Tank-mounting bracket has standard 12″ bolt hole spacing for pole mounting.

*Trade-Mark

J-70978

Westinghouse

Searching for Meter Sockets?

look to . . .

SUPERIOR
SWITCHBOARD & DEVICES CO.
CANTON 1, OHIO
A Subsidiary of
The Union Metal Manufacturing Co.

Drawn Ringless Socket

Write for a free Catalog outlining types and sizes of meter socket equipment, test switches, test blocks, reactiformers and enclosures.

transformers which are mounted in trailers.

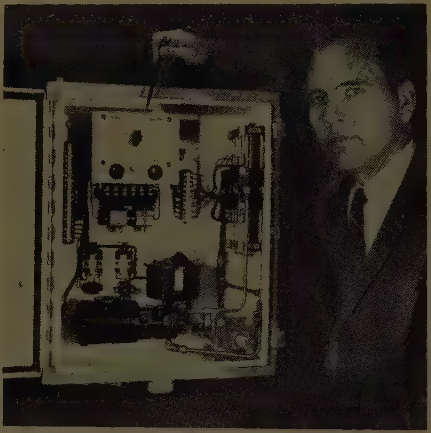
These units are designed to serve a dual function: as an emergency supply in case of transformer failure, and as a supplemental transformer for use in line changes or transformer changes. The transformers are designed for extra heavy, rugged portable operation, in that the units would be placed in a trailer and ride behind a truck during transportation.

Each transformer is rated at 50 kva, single phase, 60 cycles, and is air-cooled; the primary is designed for 4800 v and the secondary for either 120 or 240 v. It is generously designed to withstand several hours with an overload as high as 50%, the company reports.

Circle item #7 on reply card

Hydraulic Switch Operator

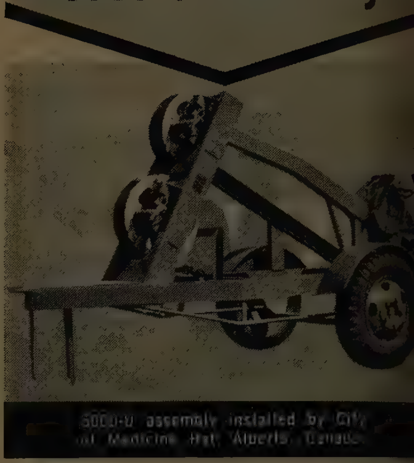
Hydraulic Airbreak Switch Operator, by **Schwager-Wood Co., Inc.**, provides to 40,000 inch pounds running torque, adjustable speed from one second to five seconds full opening or closing of the airbreak switch. One standard operator is used for 15 kv to 345 kv switches, either reciprocating or rotating controls.



Unit is designed to operate from one to six three-pole air break switches completely independent of each other, in sequence or parallel operation. When operating several switches in the same substation, the operator cost per switch is less than 50% of the cost of conventional motor operations, the firm says.

In the event of electrical failure, manual means are provided for rapid operation of the switch. The hydraulic operator does not use stored energy. There is no pressure in the hydraulic system except dur-

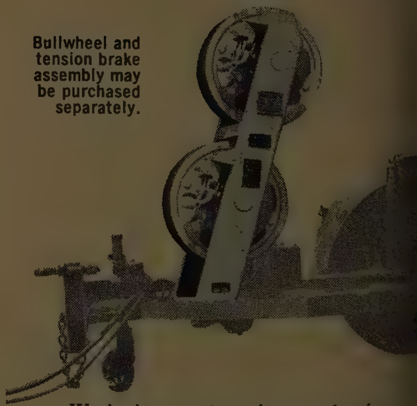
Now—Convert your own Reel Dolly to a Bullwheel Tensioner
WITH A
PENGO
5000-U Assembly



5000-U assembly installed by City of Medicine Hat, Alberta, Canada

Here's an easy way to build up a modern bullwheel tensioner at low cost—simply install a PENGO 5000-U Bullwheel Assembly to your old trailer or reel dolly. You'll have a tensioner with Neoprene-lined 26" bullwheels, capable of handling practically any distribution line stringing job at tensions to 2,000 lbs. at up to 4 mph.

Support arms, reel spindle w
reel brake, and hand rew
assembly. 2⅝" spindle w
handle reels to 75" diame
44" width unless reduced to
your trailer.



Bullwheel and tension brake assembly may be purchased separately.

We invite you to write or wire for literature, prices—please address Dept. 28

PETERSEN
ENGINEERING COMPANY, I
Santa Clara, California
Phone: AXminster 6-7712

Get ready for winter now

with Bethlehem Strand

Service interruptions were frequent and costly in many areas last winter. Snow and ice, broken limbs, and falling trees caused great damage to conductors and messenger strands alike.

When you use tough, strong Bethlehem strand as a messenger, you'll keep outages to a minimum. Bethlehem strand has exactly the right properties:

1) *High tensile strength.* Bethlehem strand is made in five grades, through Extra High Strength, to take care of all strength requirements.

2) *Good fatigue properties.* Fatigue tests show that bethanized wire is second to none.

3) *High resistance to corrosion.* Bethlehem offers 4 weights of bethanized (electrolytically applied zinc) coatings, as well as Bethalume (hot-dipped, aluminum-coated) strand for use in highly industrialized locations.

For complete information, call the nearest Bethlehem sales office.

Steel

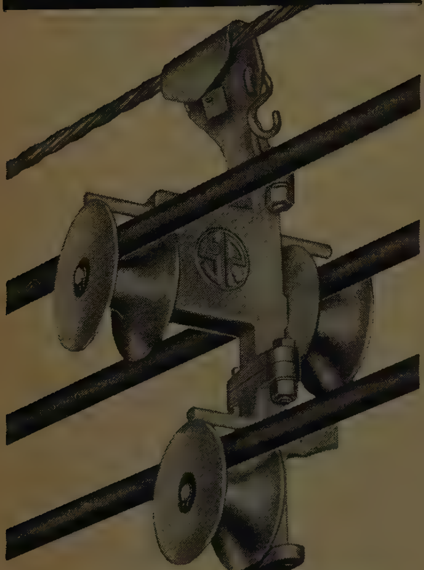
for Strength
... Economy
... Versatility

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation   Distributor: Joslyn Mfg. & Supply Co.

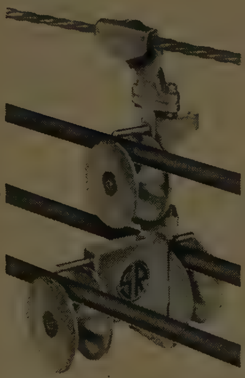
BETHLEHEM STEEL

BETHLEHEM STEEL

SR
SPACER TYPE
Aerial Cable Block
MODEL MH-303



STRING DIAMOND
. . . or INVERTED WYE
One block does it all!



All
Aluminum
Alloy

Anti-Friction
Ball Bearings
For
Easy, Accurate
Sagging

Light

Versatile

New 1961 Catalog on Request

Sherman & Reilly, Inc.
ENGINEERS AND MANUFACTURERS
First and Broad Streets
Chattanooga 2, Tennessee
Telephone AMherst 7-1273

Exclusive Canadian Representative:
A. B. Chance Company of Canada Ltd.
Box 10 Toronto 13.

ing an actual switch operation. The operator utilizes a universal ac-dc motor for 120 v and 250 v.

Circle item #8 on reply card

40 Amp Tap Changer

As a result of users' requests for larger rated self-regulating distribution transformers, **Line Material Industries** has developed a new 40-ampere tap changer. Now, with this new unit, SRT's are available through 100 kva at 2.4 and 4.16 kv, through 167 kva at 4.8 and 8 kv, through 250 kva at 7.2 and 7.62 kv, through 333 kva at 12 kv, and through 500 kva at 14.4 and 20 kv.

Rapid, snap-action tap changes are assured, says Line Material, through careful design of speed controlling components. A shaded-pole motor, which rotates only when a tap change is required, loads a drive spring that snaps the moving contact from one position to the next.

Circle item #9 on reply card

New Roadway Luminaire

A new luminaire called the Quadro-liner that controls the lighting pattern on urban and rural roads is now available from the **Westinghouse lighting division.** An open-bottom refractor is composed of four individual quadrants or sections.

Many combinations can be made for a lighting pattern to match almost any roadway lighting requirements. Annoying "spill" light can be controlled and wasted light can be eliminated.

Because of its open refractor, the Quadro-liner can be relamped and cleaned without unlatching or removing the reflector assembly.

Circle item #10 on reply card

Improved Switch

A new, improved switch which provides positive alignment of contacts is now being used on all **General Electric's** dual-voltage transformers equipped with an externally-operated switch for changing voltage level.

Developed by the Company's Distribution Transformer Dept., Pittsfield, Mass., the new switch contains spring-loaded, snap-action contacts which press against a rigid flat contact surface on each of the stationary contacts.

G.E. says the new switch will be incorporated in the dual-voltage transformers without any increase in cost to utility customers.

Used on dual-voltage transformers up through 125 kv BIL, the improved switch features positive alignment of contacts with continuing contact pressure.

Circle item #11 on reply card

FHP Electric Clutch-Brake

A pre-aligned clutch-brake package for fractional-horsepower duty-cycle applications has been introduced by the **Warner Electric Brake & Clutch Company** to fill a long standing need for easily installed automatic drives.

The Electro-Pack combines an electric clutch and an electric brake as a pre-assembled unit with input and output shaft extensions ready to bolt in place and hook up the lead wires to the power source.

The new unit simplifies the design of new equipment and speeds conversion of existing machines to automatic duty-cycle operation by eliminating the need for fabricating special mounting hardware, or for precision alignment of several different components.

Circle item #12 on reply card

MANUFACTURERS DEVELOPMENTS

-C Installs New spection Instrument

Latest inspection tool at Allis-Chalmers West Allis Vis.) Works is an automatic device for precise measement of steam turbine exhaust blade profiles.

Located in an enclosed room conditioned through re glass filters, the blade holding fixture and measing instrument is isolated against vibrational disrbances by rubber air cushions.

The measuring concept is based on the rectangular ordinate system. Each of the three axes has a zero ference correlated with the blade holding fixtures d input tape. An unlimited number of rectangular ordinates of points representing the design blade ofile can be punched into 8 column paper or input pe.

sulated Power Cable vailable From Delta-Star

Insulated power cable for up to 28 kv is now availle to utilities through the sales facilities of Deltaar Electric Division, H. K. Porter Company, Inc. in nicago. The cable is produced at the Ambridge, Pa. ant of National Electric, another division of Porter. elta-Star has 29 district sales offices throughout the untry.

This arrangement allows Delta-Star to offer electric ilities a complete line of power and control cable us power cable accessories which Delta-Star has en manufacturing for over 40 years. These cable cessory items include support systems such as exnded metal, new ladder type cable tray (Ladderay), spool insulators, cable terminators (potheads) d plugs and receptacles.

The electric utilities are now able to purchase this mplete package direct from the manufacturer and nefit from the services of Delta-Star engineers. At e same time, these engineering services are made ailable to customers of National Electric Division.

ress-Control Shields Unnecessary ith Multiple Conductors

Suspension hardware supplied for future EHV insmission lines may be considerably smaller and s expensive than some in use today, according to t results announced by Ohio Brass Company.

In outdoor tests conducted in the Company's new ll-weather" high-voltage laboratory, suspension asmblies identical to those supplied by the firm for the EP-Westinghouse 775-kv Apple Grove experimental oject have proved virtually corona-free—without control rings—at voltages up to 865-kv (500-kv to ground).

The company points out that while control rings are required on the Apple Grove line to permit accurate corona and radio influence voltage measurements on the conductor, they could be eliminated for most commercial operations at the same or even higher voltages.

G.E. Tests Fuel Assemblies

Two specially instrumented high-power density fuel assemblies are undergoing irradiation at Pleasanton, Calif. to provide General Electric engineers detailed information for the design of improved reactor cores.

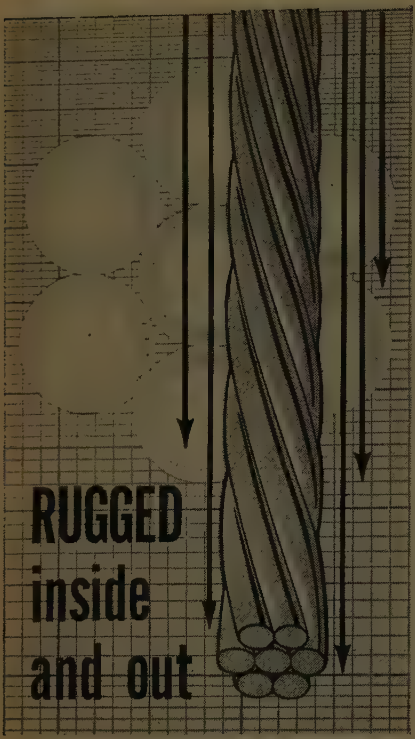
The protoype assemblies, being tested in the Vallecitos Boiling Water Reactor, are said to be the first ever developed to measure in-core, steady-state and transient hydrodynamic characteristics of a boiling water reactor.

The two special assemblies were developed as part of the $3.7-million, high-power density program which General Electric's Atomic Power Equipment Department (APED) is conducting for the Atomic Energy Commission.

230-KV Shunt Reactor Shipped To Arizona Public Service

A 25,000-kva, 230-kv shunt reactor, said to be the largest and highest voltage shunt reactor ever built in this country, was recently shipped by the Westinghouse Electric Corp. to the Arizona Public Service for service in their Cholla Steam-Electric Plant near Holbrook, Ariz. The reactor has been connected near the mid-point of the new 300-mile 345-kv transmission line through a 345/220-kv autotransformer to compensate for the capacitive charging reactance of the high-voltage lines.

This new shunt reactor consists of an air-core winding completely shielded magnetically phase to phase and phase to tank.



Crapo

GALVANIZED
STEEL STRAND

Ruggedness and reliability are built into ***Crapo*** Galvanized Steel Strand from start to finish. The selected steel is carefully processed to make the final product strong and ductile —easy to handle, work and serve. The time-proved, tightly-bonded, tough zinc coatings resist the abuse encountered in construction and provide lasting protection against corrosion.

Crapo Galvanized Steel Strand is economical, too, both in first cost and ultimate cost.

A B C

CHOOSE FROM 3 COATING WEIGHTS

A coating weight for every need— ***Crapo*** Galvanized Steel Strand is readily available in Class A, B and C weights of coating. Class B coating is twice as heavy as the standard Class A coating; Class C coating is three times as heavy.

Contact the distributor of *Crapo* Galvanized Steel Strand near you for complete information!

INDIANA
Steel & Wire Co., Inc.
Muncie, Indiana

MEN OF POWER

William H. McElwain has been elected president of Jersey Central Power & Light Company and New Jersey Power & Light Company by their respective boards of directors. He was formerly executive vice president of both companies. He succeeds **Charles E. Kohlhepp** whose retirement became effective last month.

Mr. McElwain joined the New York State Electric and Gas Corporation at Oneonta, N. Y., in 1926, and served in various capacities until 1949 when he resigned to become superintendent of operations with Metropolitan Edison Company. In 1956, he became a director and vice president of engineering and operations for JCP&L-NJP&L.

Fred I. Smith, sales vice president for JCP&L-NJP&L, has been elected to the boards of directors of both utilities.

The appointment of **Paul J. Shea** to the newly created position of agricultural engineer was announced by Minnesota Power & Light Company. He will provide farm electrification engineering service to area farmers who request such help. Farmers can avail themselves of the new service through the company's district offices in central and northeastern Minnesota. He will headquarter in the Long Prairie District office of MP&L.

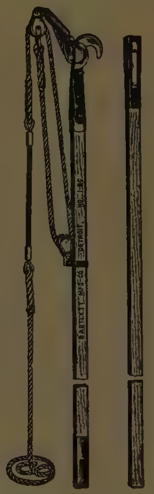
* * *

Carolina Power & Light Company has named **Joe Neal Sinclair, Jr.**, for the past six years agricultural engineer for the Lumbee River Electric Membership Corporation, as agricultural development engineer to serve its Maxton District.

* * *

W. G. Kuhns, formerly secretary and treasurer, was elected vice

(Continued on page 95)



SAFETY FIRST

BARTLETT NO. 1 BC WIRE CUTTER

The Emergency Wire Cutter is readily used to cut 110 and 220 RC wire and easily operated from the ground without use of a ladder. It can also be used safely for cutting hot 4800 volt primary and service wire when hanging down close to the ground. It has many other uses, thus it becomes the **Safest—Fastest—Easiest** tool of its kind to operate. This tool is one of the most necessary for troubleshooting. The laminated sitka spruce pole which is furnished in two 6-ft. lengths can be used either as a six foot pole or easily joined together with our P156 Sleeve to make a twelve foot pole. (Wt. complete, 8 lbs., 5 oz.) Send for illustrated Folder and Catalog No. 41.

BARTLETT MANUFACTURING CO.
3047 E. Grand Blvd., Detroit 2, Mich.

...For Locating Faults in Lead-Covered Cable ...For D-C Proof Testing

BIDDLE
CABLE
FAULT
LOCATING
EQUIPMENT

Has applications on aerial, or buried cable, as well as on lead-covered cable installed in ducts. Equipment combines a high-voltage capacitor discharge transmitter with a detector to form a complete Tracer Current Set. Provides high current and voltage output with small energy input. Equipment is moderate in size, weight and cost. Use is not restricted by networks or branches, and under certain conditions will even operate successfully without disconnecting transformers. Method of detection indicates whether fault has been reached or passed when an exploring pick-up coil is applied at various points along the cable.

Biddle Models	Output Voltage	Discharge Capacitance
Catalog 651125	Up to 25 KV	1.65 muf
Catalog 651015	Up to 15 KV	2 muf
Catalog 651005	Up to 5 KV	16 muf

B-1005 **Write for Bulletin 65-EL**

BIDDLE INSTRUMENTS

JAMES G. BIDDLE CO.
Electrical and Speed Measuring Equipment
1316 Arch Street Philadelphia 7, Pa.

(Continued from page 92)

sident of General Public Utili- Corp. following the recent re- ments of vice presidents **E. W. rehouse** and **H. A. Busch. R. H. iutt** is now treasurer, and **W. E. rner** the newly elected secre- y.

* * *

he Virginia Electric and Power mpany has announced the ap- ntment of **B. Albert Burton, II,** merly assistant to Richmond trict manager, as executive as- ant. He will replace **John K. ylor** who has been called to ac- e duty as captain with the 149th ctical Fighter Squadron of the rginia Air National Guard.

/epco has also announced the pointment of **Ivan Hall,** formerly trict superintendent of the Penin- a District, as Blue Ridge district nager, replacing **George F. Du- rg** who recently was elected vice sident of the utility's Western vision.

* * *

Robert C. Gilson has been named rehouse division sales manager Cleveland, Ohio, for Chase Brass Copper Co., a subsidiary of Ken- cott Copper Corporation.

* * *

Urner

Martin J. Urner has been elected e president in charge of Engineering and Power Production for the Potomac Edison Company. Urner joined the utility in 1925, serving in the substation construction department. The following year he was made district en- eer, and in 1928 was named as- ant distribution engineer. He ved in various other appoint- nts within the engineering organ- tion until 1958 when he was pro- ted to manager, Transmission l Distribution. In March, 1960 he s elected assistant vice president, ving in that capacity until his est assignment.

* * *

Park R. Lawson, Pennsylvania ctric Company has been elected sident of the Pennsylvania Elec- Association at the group's fifty- rth annual meeting. He succeeds **R. Parry,** vice president of Met-

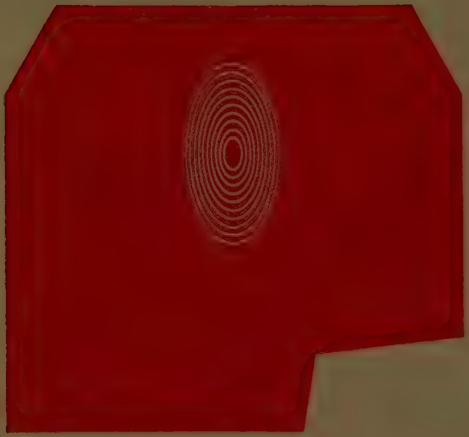
A Westinghouse Metal-Clad Switchgear advantage to you:

Isolated center coil arc chutes on DH breakers provide better magnetic field distribution and strength to increase arc interruption efficiency

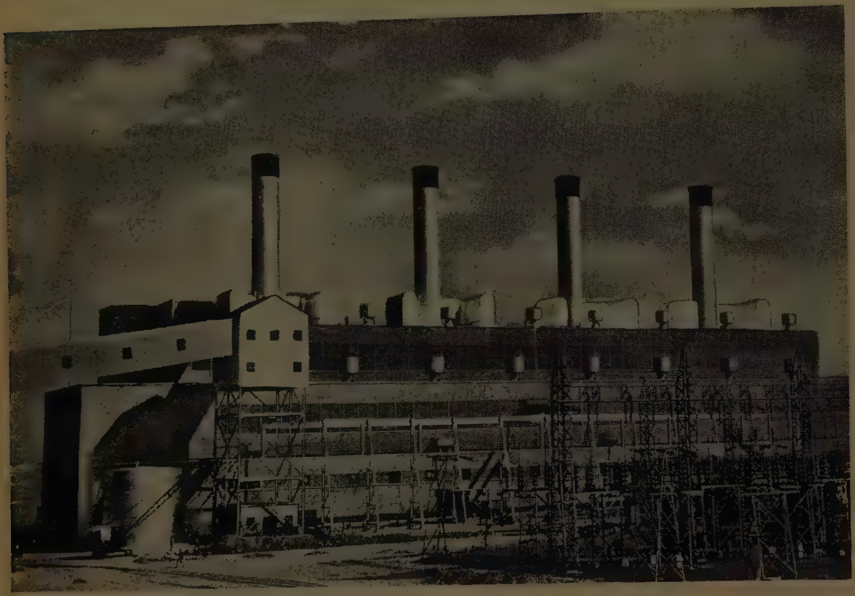
For complete facts on Westinghouse metal-clad switchgear using DH magnetic air circuit breakers, contact your Westinghouse representative or write to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

You can be sure . . . if it's **Westinghouse**

J-61019



PROVEN CONCEPTS



IN MODERN POWER DEVELOPMENT . . .

More than 30 years of achievement attest to the success of the Kuljian approach to power plant design, engineering and construction supervision. Thermal, hydroelectric, nuclear or internal combustion—for industry or utilities—Kuljian specialists know power. Write for brochure describing complete scope of Kuljian's power services.

ADDITIONAL KULJIAN SERVICES

Surveys • Investigations • Reports • Transmission and Distribution Lines • Substations • Water Resources Development

The Kuljian Corporation

engineers • constructors

KULJIAN

1200 NORTH BROAD STREET • PHILADELPHIA 21, PA.

DESIGN • ENGINEERING • PROCUREMENT • CONSTRUCTION • REPORTS

ropolitan Edison Company, who was elected president of the Association in Pittsburgh last year. Elected vice presidents were **P. M. Alden**, Philadelphia Electric Company; **Charles S. Bowden**, Pennsylvania Power Company; and **R. W. Hurd**, West Penn Power Company.

* * *

George H. Underhill, formerly deputy chief engineer, has been appointed vice president-engineering of Central Hudson Gas & Electric Corp. He will succeed **George H. Landis**, who has retired after 39 years of service. Mr. Underhill joined Central Hudson in 1920 as a junior electrical engineer, later became superintendent of electric distribution and was named assistant to the chief engineer in 1934.

Underhill

* * *

Three members of the Oklahoma Gas and Electric Company have moved into new key spots in the Company's Generation Department upon the recent retirement of **Adolph W. Walton**, who has been assistant superintendent of generation and chief electrical engineer.

T. Houston George, whose service with the Company began in 1930, has become assistant superintendent of generation. He worked at several power plants before moving to the company's General Office as a mechanical engineer in 1952.

Joe L. Barker is now chief electrical engineer in the department. Barker also joined OG&E in 1930 beginning his service in the Line Department.

William C. Doty, former mechanical engineer for the department becomes supervisor of fuels and load dispatching.

* * *

Louis J. Geiger has been appointed manager of marketing fo General Electric's Process Computer Section. He has been manage of starter and accessories sales fo the company's Industry Control Department. He will have broad overall responsibility for marketing research, product planning, sales an promotion.

egulatory— *Cont. from p. 56*

t the PUC has hardly been alert its regulatory procedure to have intenanced such variations in counting procedure.

That there was a substantial divi- n within the PUC is illustrated the statement that:

'The question presented is ether or not a utility whose ex- ng rates have been fixed on the sis of straight line depreciation taxes should be required to edit to a reserve the amount by ich its taxes are reduced through e of liberalized depreciation. The mmission has been divided con- rning the proper answer to be en to that question. On the one nd it was argued that the basis credits to a reserve has been minated by the finding in Deci- n No. 59,926 that no deferred tax bility results from the use of lib- alized depreciation. On the other nd, since the rates of the affected mpanies have been fixed on the sumption that such credits would made, it was reasoned that un- st enrichment might result if the x savings were to be reflected in gher profits rather than in a re- rve."

The Treatment Accorded Edison

The Edison Company, which had scontinued the use of normalized xes as of January 1, 1960, made an er to the Commission to transfer . . from surplus to the deferred x reserve the amount of the tax duction resulting from use of lib- alized depreciation for 1960, pro- ded the company were permitted appropriate Commission action reflect such tax savings in earn- gs beginning in 1961."

Having determined that its cur- nt earnings were not unjust or un- asonable, the Commission said:

"From the evidence it appears, d we hereby find, that the com- ny's proposal will eliminate the ssibility of unjust enrichment as result of its use of liberalized de- eciation in 1960. We also find that e company's present rates and te of return are not unreasonable r the future and that discontinu- ce of credits to the tax reserve for eralized depreciation will not re- lt in unjust enrichment."

(Continued on page 98)

A Westinghouse Outdoor Substation advantage to you:
Modular design substations let you make valuable time savings in engineering and erection, require minimum plot area and steel

For complete facts on modular design outdoor substations, contact your local Westinghouse representative or write to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.
You can be sure . . . if it's **Westinghouse**
J-61020

PRECAST CONCRETE CABLE RACEWAY

Precast concrete trench raceway now being used by many electric utilities for laying cable in substations. All joints butt and are laid dry. Surface may be used as a walk.

WRITE OR PHONE
for specifications and information.

TRENWA PRODUCTS, INC.
6502 Elbrook Ave., Cincinnati 37, Ohio
TELEPHONE: MElrose 1-5921

BIDDLE INSTRUMENTS

DIELECTRIC TEST EQUIPMENT

40 KV Model is a one-man portable set for maintenance d-c tests. Maximum safety built in. Simple operation. Reliable performance. You get excellent output voltage with facilities for voltage and leakage current measurements.

Also available: model for operation up to 100 KV and another for operation to 5 KV. Useful for development work to test d-c dielectric strength of insulating materials and adequacy of design of insulation in equipment; also in production tests for non-destructively detecting defects in electrical insulation.

Write for BULLETIN 22-EL.

BIDDLE INSTRUMENTS
JAMES G. BIDDLE CO.
Electrical and Speed Measuring Equipment
1316 Arch Street, Philadelphia 7, Pa.

It is difficult to believe that any utility in California, whether it used liberalized depreciation or not, was ever in a position where it could "unjustly enrich itself." In this connection the dissent of Commissioner Mitchell is of interest when he stated in the interim opinion and order that:

". . . the action of this Commission in requiring the Edison Company to make the transfer from surplus to tax reserve is an unjustified action that should not be imposed upon a utility which is a leader in this matter and whose forward looking action of computing income taxes on the accelerated depreciation basis is in the public interest and should be commended rather than chastised. . . . The decision of the majority will discourage utilities from converting to the flow-through method. This action, in my opinion, will tend to weaken investor confidence in California utilities and will add to the uncertainty of utility regulation in this State."

Industry In Conference

(Continued from page 48)

efficiency from an expected more rapid, and more frequent means of checks and balances of the many plant operating details; and (2) greater equipment reliability and safety from the promised quicker assimilation of operating data and the resultant faster corrective actions which should result in fewer equipment malfunctions leading to costly unscheduled outages.

"The initial design of an automatic control system capable of handling all phases of operations and malfunctions that may possibly occur costs considerably more than the training of operators. This, then, should be a compelling reason why control design efforts should be carried forward from one plant design to another and should undergo modifications only to achieve improvement and refinement in the future plant.

"The operating experiences from varied power stations throughout the country should be built in as part and parcel of the controlling system. But this can come about only through pooled contributions to a continuing review of power-plant operating controls."

Development of a digital computer program for processing turbine-generator acceptance test data was described by G. A. Maneatis and W. H. Barr of the Pacific Gas and Electric Co. This program determines all thermodynamic properties of steam and water, computes corrected test heat rate, and finally develops a contract heat rate for purposes of comparison with manufacturer's guarantees.

Data resulting from a recent test of a 330-Mw cross-compound unit installed at PG&E's Pittsburgh plant consisted of over 50 pages of recorded measurements. These included approximately 120 temperatures, 78 static pressures, 17 differential pressures and two separate power-generation measurements. These data were obtained by a group of 37 observers under the direction of five group leaders.

PG&E's program has been used on two very similar units. During the first test, using an IBM 704 computer, the time required per test point was slightly over one minute, while on the second test, using an IBM 7090, the time was reduced to 22 seconds.

This program will shortly be put into service on a routine basis evaluating turbine cycle performance employing less elaborate test equipment and instrumentation.

In a discussion of transportation of electrical energy vs. transportation of fuel, W. E. Hopkins, Stone & Webster Engineering Corp., said that "While long-term technological improvements in nuclear plant design will make this method of electrical generation attractive, the development of EHV electrical transmission systems offers the utility industry immediate benefits as a stabilizing influence to replace the rapidly diminishing competition between fuels and to provide competition for existing methods of fuel transportation. The demand for larger quantities of energy by separate distribution systems when considered individually could limit the number of economically competitive EHV transmission installations. However, the broad potential advantages of this transportation medium is inducive to industry cooperation in its use as well as its technological development.

"Control of a competing transportation facility by the largest single fuel-consuming industry could lead

aggressive participation in the de-
rmination of fuel costs. The indus-
y could be free from dependence
 intervening handling agents,
bject to opposing influences and
ntrols, for its fuel supply."

eadly Conductor *from p. 44*

nter of the span. In spite of this, e damping performance, evi-
enced by negligible chafing dam-
ge, remained equally effective to e fixed-position spiral dampers.

Successful damping of this line at easonable cost supported our deci-
on to mass-apply the same type dampers and use the same tying stem on another line in the same eneral area. This second line, of lmost identical design except for a 1/0 - 6/1 conductor size, was eing constructed during the test eriod discussed here. It was not amped initially in order to verify e chance of a freak in the case of e first line. However, after only ight months of service, this line lso showed severe tie-wire and rmor-chafing damage. Without urther testing, we applied the new piral dampers to it, retired the adly-damaged supports, and re-
rote our construction specifica-
ions to include spiral dampers on ll new transmission lines in this ortion of our service area.

POLES

AMCRECO: Poles, crossarms, lumber. Pressure treated—All standard specifications. Stocks maintained. American Creosoting Corporation, 112 S. 5th St., Louisville 2, Ky.

ELECTRIC DISTRIBUTION SUPERINTENDENT

A midwest municipal utility requires the services of an ELECTRIC DISTRIBUTION SUPERINTENDENT to supervise operation of its Electric Distribution Department. System serves approximately 21,000 accounts. Applicant must be high school graduate and have a minimum of eight years of progressively responsible experience in Electric Distribution Construction and Maintenance, including at least two years in a supervisory capacity. Send resume of education and experience to Box 1115, ELECTRIC LIGHT and POWER, 6 N. Michigan Avenue, Chicago 2, Illinois.

A Westinghouse Switchgear advantage to you:

Component selection in DFS drawout switch and fuse switchgear provides maximum application flexibility

For complete facts on DFS drawout switch and fuse switchgear, contact your local Westinghouse representative or write to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.
You can be sure . . . if it's **Westinghouse**
J-61021

Over Half a Century . . . and still ordering KUHLMAN

Good service and dependable transformers have made Kuhlman a long standing favorite of hundreds of utilities across the country.

Some customers—like the customer receiving this shipment of new '61 Kuhlman transformers—have been buying Kuhlman for more than half a century.

There is extra value in Kuhlman transformers. They are economical to operate. There's little or no maintenance. They serve faithfully year-in and year-out under all kinds of operating conditions.

Kuhlman is a quality transformer, a transformer you can depend on. That's why utilities have been using Kuhlman for so many years. Buy Kuhlman transformers on the recommendation of satisfied customers who, after half a century, are still ordering Kuhlman.

KUHLMAN TRANSFORMERS

KUHLMAN ELECTRIC COMPANY, Birmingham, Mich.
Manufacturers of transformers since 1894
FACTORIES: Bay City, Mich. • Crystal Springs, Miss. • Salinas, Calif.

CALENDAR OF EVENTS

v. 15-16—SEE Sales, Advertising & Public Relations Conference, Tides Hotel, St. Petersburg, Fla.

v. 27-28—PCEA Administration Serv-ces Section, Hotel Miramar, Santa Barbara, Calif.

v. 27-28—EEI Commercial Lighting Committee, Rochester, N. Y.

v. 27-29—American Management Association Materials Conference, Savoy-Hilton Hotel, New York, N. Y.

Nov. 26-Dec. 1—ASME Winter Annual Meeting, Statler Hilton Hotel, New York City, N. Y.

Nov. 30-Dec. 1—EEI Electric Space Heating and Air Conditioning Committee, Pittsburgh, Pa.

Nov. 30-Dec. 1—Institute of Radio Engineers, National Conference on Vehicular Communications, Radisson Hotel, Minneapolis, Minn.

Dec. 4-5—EEI Residential Electric Heating and Air Conditioning Committee Meeting, Chicago, Ill.

Dec. 5-7—EEI Street and Highway Lighting Committee Meeting, Tampa, Fla.

Dec. 8—EEI Industrial Relations Committee Meeting, Roosevelt Hotel, New York, N. Y.

Dec. 10-14—AIEE-IRE-ACM Eastern Joint Computer Conference, Sheraton-Park Hotel, Washington, D. C.

INDEX TO ADVERTISERS

erican Chain & Cable Co., Inc., Page Steel & Wire Div. 31
erican Steel & Wire Div., United States Steel Corp. 68, 69
minum Co. of America, Structural Div. 78, 79
aconda Wire & Cable Co. 53
cock & Wilcox Co., Boiler Div. 74, 75
ley Meter Co. 15, 16, 17, 18
tlett Mfg. Co. 92
kley & Co. 85
hlehem Steel Co. 89
dle Co., James G. 92, 98
wn Boveri Corp. 65
tral Transformer Corp. 19
nce Co., A. B. 52
pman Chemical Co. Inside Back Cover
vrolet Div., General Motors Corp. 62
lyer Insulated Wire Co. 27
perweld Steel Co., Wire & Cable Div. 20, 21
Dow Corning Corp. 14
Duncan Electric Co., Inc. 6
Electric Light & Power 70, 71
Electro-Motive Div., General Motors Corp. 28, 29
Fanner Mfg. Co. 93, 94
G & W Electric Specialty Co. 51
General Electric Co., Schenectady 49, Outside Back Cover
Holan Corp., The 30
Hubbard & Co. 80
Indiana Steel & Wire Co., Inc. 92
Kearney Corp., James R. 26
Kuhlman Electric Co. 100
Kuljian Corp., The 96
Lapp Insulator Co., Inc. 66, 67
Line Material Industries, McGraw-Edison Co. 11, 12, 13
Moloney Electric Co. 76, 77
Motorola Communications & Electronics, Inc. 59
Olin Conductors, Metals Div. 57
Page Steel & Wire Div., American Chain & Cable Co., Inc. 31
Penn-Union Electric Corp. Inside Front Cover
Pennsylvania Transformer Div., McGraw-Edison Co. 63, 64
Petersen Engineering Co., Inc. 88
Phelps Dodge Copper Products Corp. 60, 61
Rapid Electric Co., Inc. 85
Sangamo Electric Co. 4
Sargent & Lundy 81
Sherman & Reilly, Inc. 90
Southern States, Inc. 22, 23
Southwire Co. 55
Studebaker-Packard Corp. 72, 73
Superior Switchboard & Devices Co. 88
Trenwa Products, Inc. 98
Union Metal Mfg. Co. 32
United States Steel Corp., American Steel & Wire Div. 68, 69
Wagner Electric Corp. 24, 25
Westinghouse Electric Corp., E. Pittsburgh 86, 87, 95, 97, 99

ENGINEERING-OPERATIONS

BPA Installs EHV Test Line . . .

Bonneville Power Administrator Charles F. Luce announced recently installation of the first experimental EHV transmission line (500 kv) west of the Rockies. Highest present transmission voltage in the region is 345 kv. Luce said line tests will open the way for an eventual transmission voltage of 500 kv on the Pacific Northwest federal grid.

Two 4000-ft sections of giant aluminum conductor, over two inches in diameter, are being installed in BPA's 80-mile Big Eddy-McLoughlin 345-kv transmission line near Sandy, Oregon.

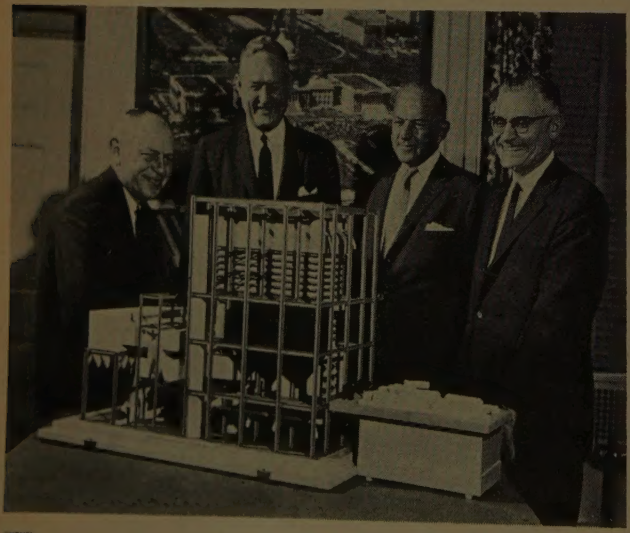
BPA's test program on the EHV sections will explore manufacturing feasibility of an expanded large conductor, determine stability under field handling conditions, provide field trials for new tools and accessories required for the large heavier conductor, and obtain operating experience on creep and vibration characteristics under varied load and weather conditions.

Supplementary laboratory tests on vibration and creep are scheduled at Washington State University and Oregon State University, respectively. Radio noise and corona tests were performed at the Lapp Insulator Company High Voltage Test Laboratory, LeRoy, New York, this summer.

Heavy equipment has been adapted by the contractor to handle the giant eight-ft reels, each of which holds a 4000-ft section of the conductor. A special compressor with a 200-ton press for application of fittings to the large conductor has been developed by the Aluminum Company of America. Largest previous compressor used in the region was a 100-ton press.

Pressures up to 200 tons are used in applying a deadend fitting to the mammoth conductor in BPA test line.

R. Roy Dunn, left, president of Potomac Electric Power Co. and S. T. Mackenzie, second from left, Babcock & Wilcox's vice president in charge of boiler division sales, examine the model of PEPCO's new Chalk Point Station following the order announcement for two boilers, capable of generating a combined total of 5-million lbs of steam/hr. With them are George Bisset, PEPCO's senior vice president and L. W. Cadwallader, right, vice president in charge of engineering, construction and operations.

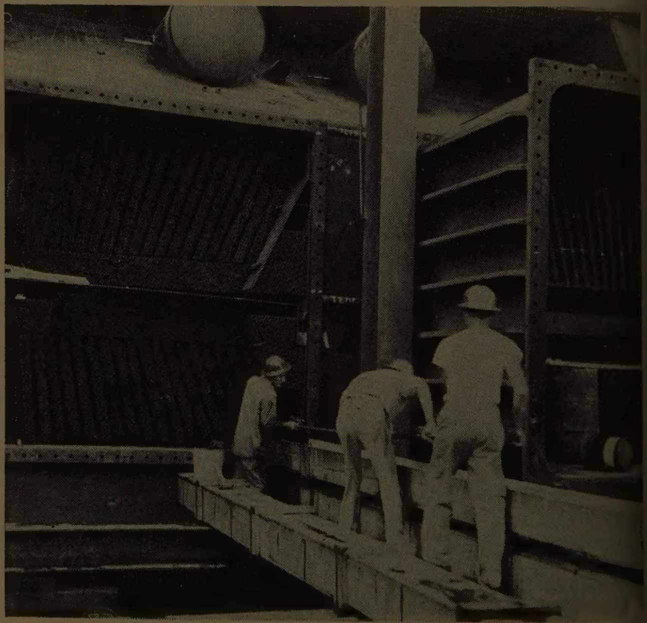


Contractor for the line and the two experimental sections is the Charles T. Parker Construction Company, Portland. Five companies supplying the test conductor are the Aluminum Company of America, Kaiser Aluminum & Chemical Sales, Inc., Anaconda Wire and Cable Company, Olin Mathieson Chemical Corporation, and the Reynolds Metals Company.

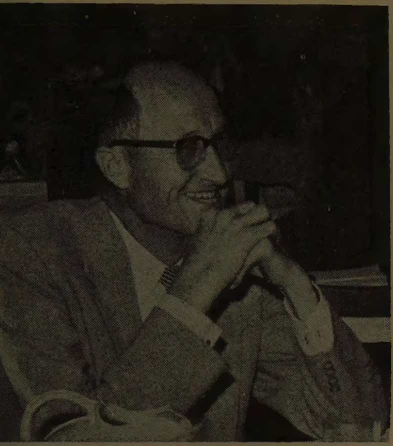
* * *

Tapered Condenser Tubes Installed . . .

Tapered tubes, recently developed by Chase Brass & Copper Co., Waterbury, Conn., are shown being installed in the new 300,000-kw Unit No. 3 condenser at Florida Power & Light Co.'s Riviera Plant. The heavy end, tapered, condenser tubes are designed to combat inlet erosion, a major cause of tube failure, according to Chase.



IGHT AND POWER LINES



'WOOD PUBLISHING COMPANY
LISHERS OF:
lectric Light and Power
oxboard Containers
ndustrial Packaging
Consumer Packaging

INESS STAFF
. Wulf, *Advertising Production*
J. Dineen, *Editorial Production*
iam Howat, *Circulation Manager*
rles F. Minor, Jr.,
President, Business Manager
shall Haywood, Jr., *President*

INESS OFFICES
CAGO 2—6 N. Michigan Ave.,
Entral 6-3690
ichael I. O'Connell, District Manager
illiam J. Hennessy, District Manager
V YORK 17—369 Lexington Ave., TN 7-2680
. A. Clabault, Vice President, Eastern Mgr.
/ELAND 15—1836 Euclid Ave.,
Rospect 1-0505
rrin Eames, Vice President, Cleveland Mgr.
FRANCISCO 5—115 New Montgomery,
Arfield 1-8513
orman A. Olson, District Manager

LECTRIC LIGHT AND POWER is published by Haywood Publishing Company of Illinois, Michigan Avenue, Chicago 2, Illinois. It is lished twice monthly and is distributed is to executives and department heads of: tric light and power companies; municipal tric organizations; rural electric cooper-es; Federal power administrations; engi-ring and management service companies ing the electric utility field; consulting neers; and companies specializing in elec- utility construction throughout the United es and her possessions. To all others there subscription charge: Manufacturers rep-ntatives—$10.00 per year; other domestic cribers—75¢ per single copy or $15.00 per ; Canadian and foreign subscribers—$1.50 single copy or $20.00 per year. Controlled ulation postage paid at Lafayette, Indiana.

yright by Haywood Publishing Company of Illinois, 1961

THE MAGAZINE OF ELECTRIC-UTILITY TECHNOLOGY

Peaks Plus Maintenance Outages Often Leave No Diversity Capacity—Although this fact is well known to those most intimately concerned with economic justification of interconnections between major load areas, many casual observers are prone to overlook or ignore it.

A plot of peak demands for a given system may show sizeable valleys over a year's period. But when a companion plot is drawn showing capacity out of service for maintenance in the same period, capacity for diversity purposes is largely cancelled out.

Thus it becomes evident that apparent diversity capacity can be largely negated by maintenance capacity.

Of course the whole problem of providing for outages—both forced and scheduled—has been greatly complicated by the shift from winter peaks to summer peaks in many areas of our country and by the explosive growth in unit capacities.

Reference to EEI's Semi-Annual Electric Power Survey evidences the changing relationship between summer and winter peaks. Nearly all regions of the U.S. show an increase in summer peak loads expressed as a percentage of peak load for the following December, for 1960 vs. 1955. A percentage of 101 is predicted for 1964 for the entire industry, as contrasted with 93 percent in 1955.

As the summer load increases, the load factor decreases. The peak, of course, is lengthening out, which in turn decreases the value of the peaking capacity, particularly the hydro capacity.

According to the EEI survey report, the annual load factor for the entire industry will decrease from 65.5 percent in 1959 and 1960 to a predicted 64.0 percent in 1964.

All of these factors enter into the complex problem of determining diversity capacity after due allowance for maintenance outages.

Free Electric Service All Year Round?—It's a revealing picture that has been drawn up by the Northern Indiana Public Service Company:

(A) The cost of money to NIPSCO today—6½ percent; cost to Indiana's REMC's (rural electric co-ops)—2 percent. This difference applied to NIPSCO's electric investment would exceed $12,000,000 annually.

(B) The REMC's pay no Federal income tax. NIPSCO now pays $10,933,000 Federal income tax annually.

(C) Totalled, these two items of subsidy amount to $22,993,000 each year.

(D) NIPSCO's entire residential and rural revenue for 1960 was $22,519,471.

(E) Thus if NIPSCO had the REMC's subsidies, and applied the full financial benefit to its residential and farm use only, it could give these customers free electric service all year round and the Company would be as well off as it is now.

Garrett

Publisher and Editor

here it is! A **REAL**

ONE-HAND TOOL

installs

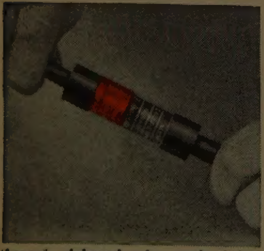
INSULINK® and LINKIT®

one crimp per end!

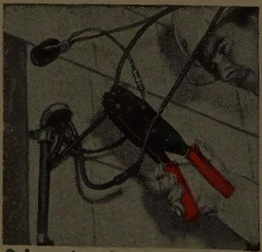
You'll like this ONE-HAND TOOL . . . from start to finish, you can really work it with only ONE HAND. You can close it with less than a 50 lbs. squeeze; it weighs only 2½ lbs. and is only 12" long. You couldn't ask for an easier service tool . . . it's the only *real* ONE-HAND TOOL.

Position the OH25 once . . . and only once . . . on each side of the INSULINK or uninsulated LINKIT. It has a new die that crimps the entire contact area at one time. You don't have to reposition, you can't overlap crimps, and you never make less than the proper number of crimps.

And, it takes only ONE CRIMP PER END . . . a series of easy, ratchet controlled strokes to make a perfect crimp every time. The new dies cause the conductor strands to rub together, removing the oxide film for more stable, low resistance connections.



Insert stripped wire ends into INSULINK; caps grip and hold conductors.



Get up close to your work. Position ONE-HAND TOOL on INSULINK only once per crimp.

A series of easy strokes complete the crimp. Dies produce oxide removing wiping action between conductor strands.

ANOTHER MAJOR DEVELOPMENT IN THE

BURNDY

60 16

COMPRESSION PROGRAM

NORWALK, CONNECT. BICC—BURNDY Ltd. Prescot, Lancs., England In Continental Europe: Antwerp, Belg TORONTO, CANA